K.S. Rangasamy College of Technology

(Autonomous)

CURRICULUM & SYLLABI

of

B.Tech. Information Technology

(For the batch admitted in 2024 – 2025)

R 2022

Accredited by NBA, Accredited by NAAC with 'A++' grade,
Approved by AICTE, Affiliated to Anna University, Chennai.

KSR Kalvi Nagar, Tiruchengode – 637 215.
Namakkal District, Tamil Nadu, India.

INFORMATION TECHNOLOGY

VISION

To emerge as an Information Technology knowledge hub by imparting quality education, promoting research and innovation.

MISSION

- To provide holistic education through curriculum update, inspired and experiential learning
- To mould the students as responsible professionals to compete with the emerging global challenges

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: **Core Competence**: Graduates will have core competence in engineering fundamentals and computing to solve hardware and software engineering problems

PEO2: **Successful Career:** Graduates will demonstrate successful professional practices in industry, academia and e-governance

PEO3: **Ethics and life-long learning:**Graduates will continue to advance in their career through life-long learning with a social and ethical concern

2. PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem analysis**: Identify, formulate, review research literature, and Analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design /development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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3. PROGRAMME SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

PSO1:	**Develop IT infrastructure:** Develop suitable IT infrastructure in diverse domains through acquired foundation skills and knowledge
PSO2:	**Design / Develop software products:** Apply necessary tools and methodologies to design and develop software products
PSO3:	**Innovative Career:** Create a zest for innovative career path through value-based software courses and entrepreneurial skills resulting in competent IT solution providers

4. PEO / PO MAPPING

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO 1	3	3	3	3	3	2	2	3	2	3	3	2
PEO 2	3	3	3	3	3	2	2	3	2	3	3	2
PEO 3	3	3	3	2	3	3	3	3	2	2	3	3

Contributions: 1- low, 2- medium, 3- high

MAPPING – UG - INFORMATION TECHNOLOGY

Year	Semester	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
Year I	I	Professional English I								2	3	3	2	3	2	2	2
		Matrices and Calculus	3	2			2									2	
		Engineering Chemistry	3	2.6											2	0.4	
		Engineering Graphics	3	2.8	3		1.2			1.2					2.8	2.8	
		C Programming	3	3	3		3				2	2		2	3	3	
		Environmental Studies and Climate Change	3	2			0.6	1.6	2.8	0.8				2			
		Heritage of Tamils / தமிழர் மரபு															
		Fabrication and Reverse Engineering Laboratory	3	1.2	3			2	2		3			3		3	3
		C Programming Laboratory	3	3	3		3				2	2		2	3	3	
	II	Professional English II								2	3	3	2	3	2.4	2.4	2.4
		Integrals, Partial Differential Equations and Laplace Transform	3	2			2							2	3	2	
		Basic Electrical and Electronics Engineering	2.6	2.8				0.4	1.4		0.6	0.8		1.6	0.4	0.4	0.4
		Physics for Computer Technology	3								2	2					
		Python Programming	3	2	3	2.8					2	2	2	2	3	3	

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		NCC/NSS/NSO/YRC/RRC/Fine Arts*															
		Tamils and Technology /தமிழரும் தொழில்நுட்பமும்															
		Python Programming Laboratory	3	2	3	2.8					2	2	2	2	3	3	
		Engineering Physics and Chemistry Laboratory	3								2				1.4	0.4	0.4
		Career Skill Development I								2	3	3	2	3	0.8	0.8	0.8
Year II	**III**	**Mathematical Statistics and Numerical Methods**	3	2			2									2	
		Data Structures	3	3	2	2.6	2	0.8	0.4	2.4	2.6	1.2		2	3	3	
		Java Programming	2.6	2.8	2.6	0.8	3			0.8	3	3	2	3	3	1.2	
		Digital Logic and Microprocessor	3	3	3	3	2					1	1	1	3	2	
		Software Engineering	3	3	2	2		3	2		3	2		2	3	3	2
		Universal Human Values						2.4	1.8	3	2.8	0.6	0.4	3			
		Data Structures Laboratory	3	3	2	1.6	1.2	0.8	0.4	1.2	2.6	1.2		2	3	3	
		Java Programming Laboratory	3	3	2.6	2.4	2.4				2			2	3	3	2
		Career Skill Development II								2	3	3	2	3	0.4	0.8	0.4
	IV	**Discrete Mathematics**	3	2			2									2	
		Design and Analysis of Algorithms	3	3	3	2	1.2					2			3	2	
		Computer Organization and Architecture	3	2	2.8	0.8	0.4	1.4	2	1	1	1	1	2	3	0.6	0.2
		Database Management Systems	3	2.6	2.6	2.8	2.2					1.6	1.6	1.2	2	2	
		Web Technology	3	2.8	2.8	3	3	2	3	3	2	3	2	2	3	3	3
		Open Elective – I	2.6	3	3	2	3	2		2	3	3	2	3	2.6	3	3
		Database Management Systems Laboratory	2.4	2.4	2.8	2	2.8				2			2	3	3	2
		Career Skill Development III	2.6	2.6	2.6	2.8		2.4				2	3	3	1.2	3	2.6
		Internship															
Year III	**V**	**Operating Systems**	3	2.6	2	2	2								2	2	
		Computer Networks	3	2.6	2.4	2	2	2			2	3			3	3	3
		Embedded Systems and IOT	3	3	3	2	2								3	3	2
		Design Thinking	3	2.8	3	2.6	3	2.4	2.8	1.6	1.8	1.2	0	0	2.6	2.6	2.6
		Professional Elective – I	2.2	2.2	2	2	1				2		2	1	2.2	2.2	2
		Open Elective – II	2.6	3	3	2	3	2		2	3	3	2	3	2.6	3	3
		Startups and Entrepreneurship	3	3	2	2.6	2	2	2	3	2.6	2		2	3	3	2
		Operating Systems and Open Source Laboratory	3	3	3	3	3				2		0.6	0.6	3	3	3
		Computer Networks Laboratory	3	3	3	3	3				2		0.6	0.6	3	3	3

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		Career Skill Development IV	2.6	2.6	2.6	2.8		2.4				2	3	3	1.2	3	2.6
	VI	**Engineering Economics and Financial Accounting**	1.6	1.2	1	2.2	0.6	0.8	1.4	0.4			2.2	2	2.2	2.6	1.4
		Data Mining and Analytics	2.8	2.4	2	2.4	1.6	2				1	1	1	3	2	
		Full Stack Development	3	2.8	2	2	1.8	1			1.4	0.8	1.8	2.2	1.8	1.8	0.8
		Machine Learning	3	2	3	2.8					2	2	2	2	3	3	
		Professional Elective – II	3	3	1.2	3	3			1.5				1	3	3	1.2
		Open Elective – III	2	2.6	2.8	2.6	3				2	2	2	2	2	2.6	2.8
		Data Mining and Analytics Laboratory	2.4	2.4	2.8	2	2.8				2			2	3	3	2
		Full Stack Development Laboratory	3	3	3	2	3	1.2	1	1	1.6	1	1.2	1	1.8	2	1
Year IV	**VII**	**Mobile Communication**	3	2.8	3	2.4	2.4	2		2	2	2		2	3	2.6	
		Cryptography and Network Security	2.8	3		0.4			1.4	0.8		1.2	0.4	0.8	3	3	
		Cloud Computing	2.6	1.4	1.8	2	2.6	0.8		2.6	2.2		2		3	2.4	2.6
		Computer Graphics and Virtual Reality	2.2	1.8	0.4	0.2	1	0.4	0.2	0.6	0.4	0.4	0.8	0.2	1	0.4	0.4
		Software Testing	3	3	3	3	3	0.8						0.6	3	3	3
		Professional Elective – III	3	2.6	2	2	2	2						2.4	3	2.6	2
		Professional Elective – IV	2.2	2.2	2	2	1				2	-	2	1	2.2	2.2	2
		Research Skill Development	0.4	0.4	0.8	0.8	0.6	0.4	0.4	3	3	2.4		3			
		Cloud Computing Laboratory	2.6	2.2	2.6	2	2.6	1.6		2.6	2.2		2		3	2.4	
		Project Work Phase - I	3	2.6	2	2	2	2						2.4	3	2.6	2
	VIII	**Professional Elective V**	3	3	3	2	3					2					
		Project Work – Phase II	2	3	2.5	3				1							

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Credit Distribution for B.Tech (IT) Programme – 2025 –2026 Batch

S.No.	Category	Credits Per Semester								Total Credits	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	02	02, 03*	-	-	-	-	03	-	07	4.32
2.	BS	07	09	04	04	-	-	-	-	24	14.81
3.	ES	11	09	03	-	-	-	-	-	23	14.20
4.	PC	-	-	13	14	16	17	14	-	74	45.68
5.	PE	-	-	-	-	03	03	06	03	15	9.26
6.	OE	-	-	-	03	03	03	-	-	09	5.56
7.	CG	-	CSD I	CSD II	CSD III	CSD IV	1*	02	08	10	6.17
8.	MC	MC I	-	MC II	-	MC III	-	-	-	-	-
9.	AC	-	-	-	-	-	-	AC I	AC II	-	-
	Total	20	20	20	21	22	23	25	11	162	-

HS – HUMANITIES AND SOCIALSCIENCES

BS – BASIC SCIENCE

ES – ENGINEERING SCIENCES

PC -PROFESSIONAL CORE

PE – PROFESSIONAL ELECTIVES

MC – MANDATORY COURSES

OE – OPEN ELECTIVES

CG- CAREER GUIDANCE COURSES

AC- AUDIT COURSES

Open Electives are courses offered by different departments that do not have any prerequisites and could be of interest to students of any branch.

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(An Autonomous Institution affiliated to Anna University)
CONCEIVE DEVELOP IMPLEMENT EXECUTE (CDIE)

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 EN 001	Professional English I	HS	3	1	0	2	2	Basic knowledge of reading and writing in English
2.	60 EN 002	Professional English II	HS	3	1	0	2	2	Basic knowledge of reading and writing in English and should have completed Professional English I
3.	60 HS 002	Engineering Economics and Financial Accounting	HS	3	3	0	0	3	Basic Mathematics
4.	60 AB 001	National Cadet Corps (Air Wing)	HS	4	2	0	2	3*	Nil
5.	60 AB 002	National Cadet Corps (Army Wing)	HS	4	2	0	2	3*	Nil

BASIC SCIENCES (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 MA 001	Matrices and Calculus	BS	5	3	1	0	4	Nil
2.	60 CH 004	Engineering Chemistry	BS	3	3	0	0	3	Nil
3.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	BS	5	3	1	0	4	Nil
4.	60 PH 004	Physics for Computer Technology	BS	3	3	0	0	3	Nil
5.	60 CP 0P2	Engineering Physics and Chemistry Laboratory	BS	4	0	0	4	2	Nil
6.	60 MA 010	Mathematical Statistics and Numerical Methods	BS	5	3	1	0	4	Basis Algebra, Statistics
7.	60 MA 017	Discrete Mathematics	BS	5	3	1	0	4	Calculus I,II

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 ME 002	Engineering Graphics	ES	6	2	0	4	4	Nil
2.	60 CS 001	C Programming	ES	3	3	0	0	3	Nil
3.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2	Nil
4.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2	Nil
5.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3	Nil
6.	61 EC 001	Digital Logic and Microprocessor	ES	4	2	0	2	3	Basic of Electrical and ElectronicsEngineering

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PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT 001	Python Programming	PC	5	3	1	0	4	Basic knowledge of Higher Secondary Mathematics, Binary Operations & Mathematical Logic
2.	60 IT 0P1	Python Programming Laboratory	PC	4	0	0	4	2	Basic knowledge of Higher Secondary Mathematics, Binary Operations & Mathematical Logic
3.	60 CS 003	Data Structures	PC	3	3	0	0	3	C
4.	60 CS 004	Java Programming	PC	3	3	0	0	3	C++
5.	60 IT 301	Software Engineering	PC	3	3	0	0	3	UML Concepts
6.	61 CS 0P3	Data Structures Laboratory	PC	4	0	0	4	2	C
7.	60 CS 0P4	Java Programming Laboratory	PC	4	0	0	4	2	C++
8.	60 IT 002	Design and Analysis of Algorithms	PC	3	3	0	0	3	Data Structure
9.	60 IT 401	Computer Organization and Architecture	PC	3	3	0	0	3	Foundations of Computer Design
10.	60 IT 402	Database Management Systems	PC	3	3	0	0	3	Relational Algebra, Data Structure, Java Programming
11.	60 IT 403	Web Technology	PC	5	1	0	4	3	Java Programming
12.	60 IT 4P1	Database Management Systems Laboratory	PC	4	0	0	4	2	Relational Algebra, Data Structure, Java Programming
13.	60 IT 501	Operating Systems	PC	3	3	0	0	3	Good knowledge of C, Computer Organization and Architecture, x86 Assembly level programming.
14.	60 IT 502	Computer Networks	PC	3	3	0	0	3	C or Java Programming
15.	61 IT 503	Embedded systems and IoT	PC	3	3	0	0	3	Microprocessor, Basic programming
16.	61 IT 003	Design Thinking	PC	4	2	0	2	3	Basic Programming Skills
17.	60 IT 5P1	Operating Systems and Open Source Laboratory	PC	4	0	0	4	2	Good knowledge of C, Computer Organization and Architecture

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18.	60 IT 5P2	Computer Networks Laboratory	PC	4	0	0	4	2	C or Java Programming
19.	60 IT 601	Data Mining and Analytics	PC	3	3	0	0	3	Database Management Systems, Basic Statistics
20.	61 IT 602	Full Stack Development	PC	3	3	0	0	3	Front-end Languages and Frameworks (HTML, CSS, JavaScript), Backend Technologies and Frameworks (NodeJS, ExpressJS, Django, Flask, C++), Database Management Systems (MySQL, SQL SERVER and PostgreSQL, MongoDB, and Oracle Database)
21.	60 IT 603	Machine Learning	PC	5	3	1	0	4	Data Mining, Basic Statistics
22.	61 IT 6P1	Data Mining and Analytics Laboratory	PC	4	0	0	4	2	Database Management Systems, Basic Statistics
23.	60 IT 6P2	Full Stack Development Laboratory	PC	4	0	0	4	2	Front-end Languages and Frameworks (HTML, CSS, JavaScript), Backend Technologies and Frameworks
24.	60 IT 6P3	Mini Project	PC	2	0	0	2	1*	
25.	60 IT 701	Mobile Communication	PC	3	3	0	0	3	Analog and Digital Communication
26.	60 IT 702	Cryptography and Network Security	PC	3	3	0	0	3	Basic knowledge of Mathematics and Cryptography and Network Security
27.	60 IT 703	Cloud Computing	PC	3	3	0	0	3	Basics of Networking
28.	60 IT 704	Computer Graphics and Virtual Reality	PC	4	2	0	2	3	Knowledge of data structures and algorithms
29.	60 IT 705	Software Testing	PC	3	3	0	0	3	Software Engineering
30.	60 IT 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2	Basic programming skill

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PROFESSIONAL ELECTIVES (PE) / HONOURS

SEMESTER V, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT E11	Mathematical Foundations of Data Science	PE	3	3	0	0	3	Data Mining, Machine Learning
2.	60 IT E12/ 60 IT L04	C# and .NET Framework	PE	3	3	0	0	3	C or C++ or any programming language or programming fundamentals
3.	60 IT E13	Telecommunication Systems	PE	3	3	0	0	3	Digital Logic Circuits
4.	60 IT E14	Bioinformatics	PE	3	3	0	0	3	Data Mining
5.	60 IT E15	Information Security	PE	3	3	0	0	3	Cryptography and Network Security
6.	60 IT E16	Compiler Design	PE	3	3	0	0	3	Knowledge of automata theory, context free languages, computer architecture, data structures and simple graph algorithms, logic or algebra.
7.	60 CS E16	Industrial Cloud Practices	PE	3	3	0	0	3	Basics of Networking
8.	60 CS E17	DevOps	PE	3	3	0	0	3	Basics of Networking

Note : Any of the elective course can be opted for honour degree

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT E21	Business Analytics	PE	4	2	0	2	3	Data Mining
2.	60 IT E22	Mobile Application Development	PE	4	2	0	2	3	Java Programming
3.	60 IT E23	Multimedia and Animation	PE	4	2	0	2	3	Computer Graphics
4.	60 IT E24	Soft Computing and Optimization	PE	4	2	0	2	3	Mathematics and programming concepts
5.	60 IT E25	Cyber Security and Forensics	PE	4	2	0	2	3	Cyber Crime
6.	60 IT E26	Big Data Analytics	PE	4	2	0	2	3	Mathematics and Python and R programming
7.	60 CS E27	Advanced Java	PE	3	3	0	0	3	Basics of Java
8.	60 CS E37	Data Analytics	PE	3	3	0	0	3	Mathematics and programming concepts

Note : Any of the elective course can be opted for honour degree

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SEMESTER VII, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT E31	Information Retrieval Techniques	PE	3	3	0	0	3	DBMS and Web Technology
2.	60 IT E32	Distributed Computing	PE	3	3	0	0	3	Operating Systems.
3.	60 IT E33	Wireless Sensor Networks	PE	3	3	0	0	3	Computer networks
4.	60 IT E34	Digital Image Processing	PE	3	3	0	0	3	Integrals, Partial Differential Equations and Laplace Transform
5.	60 IT E35	Blockchain Technologies	PE	3	3	0	0	3	Basic knowledge of Internet.
6.	60 IT E36	Web of Things	PE	3	3	0	0	3	Basic knowledge of Web Development
7.	60 CS E47	Advanced .NET	PE	3	3	0	0	3	C or C++ or programming fundamentals

Note : Any of the elective course can be opted for honour degree

SEMESTER VII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT E41	Web Mining	PE	3	3	0	0	3	Basic knowledge of Web Page.
2.	60 IT E42	Open Source Software	PE	3	3	0	0	3	Open Source Software, MongoDB, NodeJS and RUST Programming
3.	60 IT E43	High Performance Networks	PE	3	3	0	0	3	Computer Networks
4.	60 IT E44	Distributed Component Architecture	PE	3	3	0	0	3	Web Technology
5.	60 IT E45	Database Security and Access Control	PE	3	3	0	0	3	Basic Knowledge of Database security and Access control.
6.	60 IT E46	Business Intelligence	PE	3	3	0	0	3	Basic knowledge of Business Intelligence
7.	60 CS E48	Cyber Security	PE	3	3	0	0	3	Basics of Networking

Note : Any of the elective course can be opted for honour degree

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SEMESTER VIII, ELECTIVE V

SNo.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT E51	Intelligent Database Systems	PE	3	3	0	0	3	Database Management Systems
2.	60 IT E52	XML Web Services	PE	3	3	0	0	3	XML, HTTP, TCP/IP concepts, and understanding of networking concepts.
3.	60 IT E53	Social Network Analysis	PE	3	3	0	0	3	Computer Network
4.	60 IT E54	Data Science with Python	PE	3	3	0	0	3	Python Proficiency
5.	60 IT E55	Augmented Reality	PE	3	3	0	0	3	Nil
6.	60 IT E56	Ethical Hacking	PE	3	3	0	0	3	Computer Networks

Note : Any of the elective course can be opted for honour degree

SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 AC 001	Research Skill Development	AC	1	1	0	0	0	NIL

GENERAL ELECTIVE COURSES (GE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	61 GE 001	Heritage of Tamils / தமிழர் மரபு	GE	1	1	0	0	1$	NIL
2.	60 GE 002	Tamils and Technology/ தமிழரும் தொழில்நுட்பமும்	GE	1	1	0	0	1$	Heritage of Tamils

MANDATORY COURSES (MC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 MY 001	Environmental Studies and Climatie Change	MC	2	2	0	0	0	NIL
2.	60 MY 002	Universal Human Values	MC	3	3	0	0	3	NIL
3.	60 MY 003	Startups and Entrepreneurship	MC	2	2	0	0	2*	NIL
4	60 MY 004	Disaster Management	MC	2	2	0	0	0	NIL

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OPEN ELECTIVES (OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT L01	Python Programming	OE	3	3	0	0	3	Basic knowledge of mathematics and programming
2.	60 IT L02	Android App Development	OE	3	3	0	0	3	Basics knowledge of Java programming
3.	60 IT L03	Power BI	OE	5	1	0	4	3	Basics of Data Analytics.
4.	60 IT E12/ 60 IT L04	C# and .NET Framework	OE	3	3	0	0	3	C or C++ or any programming language or programming fundamentals
5.	60 IT L05	Web Design	OE	3	3	0	0	3	Java Programming

INTEGRATED COURSES

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	61 EC 001	Digital Logic and Microprocessor	ES	4	2	0	2	3	Basics of Electrical and Electronics Engineering
2.	61 IT 003	Design Thinking	PC	4	2	0	2	3	Basic Programming Skills
3.	60 IT E21	Business Analytics	PE	4	2	0	2	3	Data Mining
4.	60 IT E22	Mobile Application Development	PE	4	2	0	2	3	Java Programming
5.	60 IT E23	Multimedia and Animation	PE	4	2	0	2	3	Computer Graphics
6.	60 IT E24	Soft Computing and Optimization	PE	4	2	0	2	3	Mathematics and programming concepts
7.	60 IT E25	Cyber Security and Forensics	PE	4	2	0	2	3	Cyber Crime
8.	60 IT E26	Big Data Analytics	PE	4	2	0	2	3	Mathematics and Python and R programming
9.	60 IT 704	Computer Graphics and Virtual Reality	PC	4	2	0	2	3	Knowledge of data structures and algorithms

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CAREER GUIDANCE COURSES (CGC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Prerequisite
1.	60 IT 7P2	Project Work - Phase I	CG	4	0	0	4	2	Subjects from Semester I –VI
2.	60 IT 8P1	Project Work - Phase II	CG	16	0	0	16	8	Subjects from Semester I –VII
3.	60 CG 0P1	Career Skill Development I	CG	2	0	0	2	1*	Basic Mathematics
4.	60 CG 0P2	Career Skill Development II	CG	2	0	0	2	1*	Basic Verbal's
5.	60 CG 0P3	Career Skill Development III	CG	2	0	0	2	1*	Basic Communication
6.	60 CG 0P4	Career Skill Development IV	CG	2	0	0	2	1*	Basics Management Technique
7.	60 CG 0P5	Comprehension Test	CG	2	0	0	2	1*	Basics of CSD
8.	60 CG 0P6	Internship	CG	0	0	0	0	1/2/3*	Basics Subject Knowledge

*** denotes Extra credits will be awarded**

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K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)
COURSES OF STUDY
(For the candidates admitted in 2025 - 2026)

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
		Induction Programme	-	-	-	-	-	0
THEORY								
1.	60 EN 001	Professional English I	HS	3	1	0	2	2
2.	60 MA 001	Matrices and Calculus	BS	5	3	1	0	4
3.	60 CH 004	Engineering Chemistry	BS	3	3	0	0	3
4.	60 ME 002	Engineering Graphics	ES	6	2	0	4	4
5.	60 CS 001	C Programming	ES	3	3	0	0	3
6.	60 MY 001	Environmental Studies and Climate Change	MC	2	2	0	0	0
7.	61 GE 001	Heritage of Tamils / தமிழர் மரபு	GE	1	1	0	0	1$
PRACTICALS								
8.	61 ME 0P1	Fabrication and Reverse Engineering Laboratory	ES	4	0	0	4	2
9.	60 CS 0P1	C Programming Laboratory	ES	4	0	0	4	2
Total				**30**	**15**	**01**	**14**	**20**

$Heritage of Tamils/ தமிழர் மரபு, Extra 1 credit is offered

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 EN 002	Professional English II	HS	3	1	0	2	2
2.	60 MA 003	Integrals, Partial Differential Equations And Laplace Transform	BS	5	3	1	0	4
3.	60 EE 001	Basic Electrical and Electronics Engineering	ES	3	3	0	0	3
4.	60 PH 004	Physics for Computer Technology	BS	3	3	0	0	3
5.	60 IT 001	Python Programming	PC	5	3	1	0	4
6.	60 GE 002	Tamils and Technology /தமிழரும் தொழில்நுட்பமும்	GE	1	1	0	0	1$
PRACTICALS								
7.	60 CP 0P2	Engineering Physics and Chemistry Laboratory	BS	4	0	0	4	2
8.	60 IT 0P1	Python Programming Laboratory	PC	4	0	0	4	2
9.	60 CG 0P1	Career Skill Development I	CG	2	0	0	2	1*
Total				**30**	**14**	**02**	**12**	**20**

$Tamils and Technology / தமிழரும் தொழில்நுட்பமும், Extra 1 credit is offered
*** Career Skill Development additional credits is offered based on the duration**

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SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 MA 010	Mathematical Statistics and Numerical Methods	BS	5	3	1	0	4
2.	60 CS 003	Data Structures	PC	3	3	0	0	3
3.	60 CS 004	Java Programming	PC	3	3	0	0	3
4.	61 EC 001	Digital Logic and Microprocessor	ES	4	2	0	2	3
5.	60 IT 301	Software Engineering	PC	3	3	0	0	3
6.	60 MY 002	Universal Human Values	MC	3	3	0	0	3*
PRACTICALS								
7.	61 CS 0P3	Data Structures Laboratory	PC	4	0	0	4	2
8.	60 CS 0P4	Java Programming Laboratory	PC	4	0	0	4	2
9.	60 CG 0P2	Career Skill Development II	CG	2	0	0	2	1*
10.	60 CG 0P6	Internship	CG	0	-	-	-	1/2/3*
Total				**31**	**17**	**01**	**12**	**20**

*** UHV extra credit is offered.**
*** Career Skill Development additional credits is offered based on the duration**
*** Internship additional credits is offered based on the duration**

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 MA 017	Discrete Mathematics	BS	5	3	1	0	4
2.	60 IT 002	Design and Analysis of Algorithms	PC	3	3	0	0	3
3.	60 IT 401	Computer Organization and Architecture	PC	3	3	0	0	3
4.	60 IT402	Database Management Systems	PC	3	3	0	0	3
5.	60 IT403	Web Technology	PC	5	1	0	4	3
6.	60 OE L0*	Open Elective – I	OE	3	3	0	0	3
PRACTICALS								
7.	60 IT4P1	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	60 CG 0P3	Career Skill Development III	CG	2	0	0	2	1*
9.	60 CG 0P6	Internship	CG	0	-	-	-	1/2/3*
			Total	**28**	**16**	**01**	**10**	**21**

*** Career Skill Development additional credits is offered based on the duration**
*** Internship additional credits is offered based on the duration**

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SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 IT 501	Operating Systems	PC	3	3	0	0	3
2.	60 IT 502	Computer Networks	PC	3	3	0	0	3
3.	61 IT 503	Embedded Systems and IOT	PC	3	3	0	0	3
4.	61 IT 003	Design Thinking	PC	4	2	0	2	3
5.	60 IT E1*	Professional Elective – I	PE	3	3	0	0	3
6.	60 OE L0*	Open Elective – II	OE	3	3	0	0	3
7.	60 MY 003	Startups and Entrepreneurship	MC	2	2	0	0	2*
PRACTICALS								
8.	60 IT 5P1	Operating Systems and Open Source Laboratory	PC	4	0	0	4	2
9.	60 IT 5P2	Computer Networks Laboratory	PC	4	0	0	4	2
10.	60 CG 0P4	Career Skill Development IV	CG	2	0	0	2	1*
11.	60 CG 0P6	Internship	CG	0	-	-	-	1/2/3*
Total				**31**	**19**	**0**	**12**	**22**

*** Career Skill Development additional credits is offered**
*** Internship additional credits is offered based on the duration**

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 HS 002	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
2.	60 IT 601	Data Mining and Analytics	PC	3	3	0	0	3
3.	61 IT 602	Full Stack Development	PC	3	3	0	0	3
4.	60 IT 603	Machine Learning	PC	5	3	1	0	4
5.	60 IT E2*	Professional Elective – II	PE	4	2	0	2	3
6.	60 OE L0*	Open Elective – III	OE	3	3	0	0	3
PRACTICALS								
7.	61 IT 6P1	Data Mining and Analytics Laboratory	PC	4	0	0	4	2
8.	60 IT 6P2	Full Stack Development Laboratory	PC	4	0	0	4	2
9.	60 IT 6P3	Mini Project	PC	2	0	0	2	1*
10.	60 CG 0P5	Comprehension Test	CG	2	0	0	2	1*
11.	60 CG 0P6	Internship	CG	0	-	-	-	1/2/3*
			Total	**33**	**17**	**01**	**14**	**23**

*** Mini project& - 1 additional credit is offered and not accounted for CGPA calculation**
*** Comprehension Test -one additional credit is offered and not accounted for CGPA calculation.**
*** Internship additional credits is offered based on the duration**

Rev. No.1/w.e.f. 13.06.2026
Approved Passed in BoS Meeting held on 06.05.2026
in Academic Council Meeting held on 13.06.2026

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SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 IT 701	Mobile Communication	PC	3	3	0	0	3
2.	60 IT 702	Cryptography and Network Security	PC	3	3	0	0	3
3.	60 IT 703	Cloud Computing	PC	3	3	0	0	3
4.	60 IT 704	Computer Graphics and Virtual Reality	PC	4	2	0	2	3
5.	60 IT 705	Software Testing	PC	3	3	0	0	3
6.	60 IT E3*	Professional Elective – III	PE	3	3	0	0	3
7.	60 IT E4*	Professional Elective – IV	PE	3	3	0	0	3
8.	60 AC 001	Research Skill Development	AC	1	1	0	0	0
9.	60 AB 00*	NCC/NSS/NSO/YRC/RRC/Fine Arts*	HS	4	2	0	2	3
PRACTICALS								
10.	60 IT 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2
11.	60 IT 7P2	Project Work Phase – I	CG	4	0	0	4	2
12.	60 CG 0P6	Internship	CG	0	-	-	-	1/2/3*
			Total	**35**	**23**	**0**	**12**	**25**

***NCC/NSS/NSO/YRC/RRC/Fine Arts* 3 credits can be waived /extra credit is offered.**
*** Internship additional credits is offered based on the duration**

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	60 IT E5*	Professional Elective – V	PE	3	3	0	0	3
PRACTICALS								
2.	60 IT 8P1	Project Work Phase - II	CG	16	0	0	16	8
3.	60 CG 0P6	Internship	CG	0	-	-	-	1/2/3*
			Total	**19**	**3**	**0**	**16**	**11**

*** Internship additional credits is offered based on the duration**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 162

Note:
HS- Humanities and Social Sciences including Management Courses,
BS - Basic Science Courses,
ES - Engineering Science Courses,
PC - Professional Core Courses,
PE - Professional Elective Courses,
GE - General Elective Courses,
OE - Open Elective Courses,
CG - Career Enhancement Course,
MC - Mandatory Courses

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PROFESSIONAL ELECTIVES (PE) / HONOURS

SEMESTER V, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 IT E11	Mathematical Foundations of Data Science	PE	3	3	0	0	3
2.	60 IT E12/ 60 IT L04	C# and .NET Framework	PE	3	3	0	0	3
3.	60 IT E13	Telecommunication Systems	PE	3	3	0	0	3
4.	60 IT E14	Bioinformatics	PE	3	3	0	0	3
5.	60 IT E15	Information Security	PE	3	3	0	0	3
6.	60 IT E16	Compiler Design	PE	3	3	0	0	3
7.	60 CS E16	Industrial Cloud Practices	PE	3	3	0	0	3
8.	60 CS E17	DevOps	PE	3	3	0	0	3

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 IT E21	Business Analytics	PE	4	2	0	2	3
2.	60 IT E22	Mobile Application Development	PE	4	2	0	2	3
3.	60 IT E23	Multimedia and Animation	PE	4	2	0	2	3
4.	60 IT E24	Soft Computing and Optimization	PE	4	2	0	2	3
5.	60 IT E25	Cyber Security and Forensics	PE	4	2	0	2	3
6.	60 IT E26	Big Data Analytics	PE	4	2	0	2	3
7.	60 CS E27	Advanced Java	PE	3	3	0	0	3
8.	60 CS E37	Data Analytics	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 IT E31	Information Retrieval Techniques	PE	3	3	0	0	3
2.	60 IT E32	Distributed Computing	PE	3	3	0	0	3
3.	60 IT E33	Wireless Sensor Networks	PE	3	3	0	0	3
4.	60 IT E34	Digital Image Processing	PE	3	3	0	0	3
5.	60 IT E35	Blockchain Technologies	PE	3	3	0	0	3
6.	60 IT E36	Web of Things	PE	3	3	0	0	3
7.	60 CS E47	Advanced .NET	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 IT E41	Web Mining	PE	3	3	0	0	3
2.	60 IT E42	Open Source Software	PE	3	3	0	0	3
3.	60 IT E43	High Performance Networks	PE	3	3	0	0	3
4.	60 IT E44	Distributed Component Architecture	PE	3	3	0	0	3
5.	60 IT E45	Database Security and Access Control	PE	3	3	0	0	3
6.	60 IT E46	Business Intelligence	PE	3	3	0	0	3
7.	60 CS E48	Cyber Security	PE	3	3	0	0	3

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SEMESTER VIII, ELECTIVE V

SNo.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	60 IT E51	Intelligent Database Systems	PE	3	3	0	0	3
2.	60 IT E52	XML Web Services	PE	3	3	0	0	3
3.	60 IT E53	Social Network Analysis	PE	3	3	0	0	3
4.	60 IT E54	Data Science with Python	PE	3	3	0	0	3
5.	60 IT E55	Augmented Reality	PE	3	3	0	0	3
6.	60 IT E56	Ethical Hacking	PE	3	3	0	0	3

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE =162

BS : Basic Science

HS : Humanities and Social Science
ES : Engineering Science
MC : Mandatory Course

L : Lecture
T : Tutorial
P : Practical

Note:
1 Hour Lecture is Equivalent to 1 Credit
1 Hours Tutorial is Equivalent to 1 Credit
2 Hours Practical is Equivalent to 1 Credit

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CURRICULUM & SYLLABI

K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2025 - 2026)

FIRST SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment *	End Semester Exam **	Max. Marks		
		Induction Programme	-	-	-	-	-	0
THEORY								
1.	60 EN 001	Professional English I	2	40	60	100	45	100
2.	60 MA 001	Matrices and Calculus	2	40	60	100	45	100
3.	60 CH 004	Engineering Chemistry	2	40	60	100	45	100
4.	60 ME 002	Engineering Graphics	2	40	60	100	45	100
5.	60 CS 001	C Programming	2	40	60	100	45	100
6.	60 MY 001	Environmental Studies and Climate Change	2	100	-	100	-	100
7.	61 GE 001	Heritage of Tamils / தமிழர் மரபு	2	40	60	100	45	100
PRACTICALS								
8.	60 ME 0P1	Fabrication and Reverse Engineering Laboratory	2	60	40	100	45	100
9.	60 CS 0P1	C Programming Laboratory	2	60	40	100	45	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination and 40 marks for practical End Semester Examination.

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60 EN 001	Professional English I	Category	L	T	P	Credit
		HS	1	0	2	2

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in english in real life and career related situations
- To equip students with effective speaking and listening skills in english
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Pre-requisites

- Basic knowledge of reading and writing in English.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and interpret complex academic texts	Understand
CO2	Recall the denotative and connotative meanings of technical texts	Remember
CO3	Interpret definitions, descriptions, narrations, and essays on various topics	Understand
CO4	Express fluently and accurately in formal and informal communicative contexts	Understand
CO5	Summarize their opinions effectively in both oral and written medium of communication	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO4	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	50	50	80
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

60 EN 001 - Professional English I

Common to All Branches

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	2	45	2	40	60	100

Introduction to Fundamentals of Communication* **Listening:** General Information-Specific Details - Conversation: Introduction to Classmates – Audio/ Video (Formal & Informal). **Speaking:** Self Introduction; Introducing a Friend; Conversation – Politeness Strategies. **Reading:** Reading Brochures (Technical Context), Telephone Messages / Social Media Messages Relevant to Technical Contexts and Emails. **Writing:** Writing Letters – Informal and Formal – Basics and Format Orientation **Language Focus:** Present Tenses; Word Formation (Affixes); Synonyms, Antonyms and Contranyms, and Phrasal Verbs; Abbreviations & Acronyms (as Used in Technical Contexts).	[9]
Narration and Summation* **Listening:** Podcast, Anecdotes / Stories / Event Narration; Documentaries and Interviews with Celebrities. **Speaking:** Narrating Personal Experiences / Events; Interviewing a Celebrity; Reporting / and Summarizing of Documentaries / Podcasts/ Interviews. **Reading:** Biographies, Travelogues, Newspaper Reports, Excerpts from Literature, and Travel & Technical Blogs. **Writing:** Paragraph Writing, Short Report on an Event (Field Trip etc.). **Language Focus:** Past Tenses and Prepositions; One-Word Substitution.	[9]
Description of a Process / Product* **Listening:** Listen to A Product and Process Descriptions; Advertisements about Products or Services **Speaking:** Picture Description; Giving Instruction to use the Product; Presenting a Product. **Reading:** Advertisements, Gadget Reviews and User Manuals. **Writing:** Definitions; Instructions; and Product /Process Description. **Language Focus:** Imperatives; Comparative Adjectives; Future Tenses. Homonyms; and Homophones, Discourse Markers (Connectives & Sequence Words)	[9]
Classification and Recommendations* **Listening:** TED Talks; Scientific Lectures; and Educational Videos. **Speaking:** Small Talk; Mini Presentations **Reading:** Newspaper Articles and Journal Reports **Writing :** Note-Making / Note-Taking; Recommendations; Transferring Information from Non-Verbal (Chart, Graph etc, to Verbal Mode) **Language Focus:** Articles; Pronouns -Possessive & Relative Pronouns; Subject-Verb Agreement; Collocations.	[9]
Expression* **Listening:** Debates/ Discussions; Different Viewpoints on an Issue; and Panel Discussions. **Speaking:** Group Discussions, Debates & Role Plays. **Reading:** Editorials and Opinion Blogs. **Writing :** Essay Writing (Descriptive or Narrative). **Language Focus:** Punctuation; Compound Nouns; Simple, Compound & Complex Sentences. Cause & Effect Expressions.	[9]
Total Hours:	**45**

Text Book(s):

1. "English for Engineers & Technologists" Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2. Norman Lewis, "Word Power Made Easy – The Complete Handbook for Building a Superior Vocabulary Book", Penguin Random House India, 2020

Reference(s):

1. Paul Emmerson and Nick Hamilton, "Five Minute Activities for Business English", Cambridge University Press, New York, 2005
2. Arthur Brookes and Peter Grundy, "Beginning to Write: Writing Activities for Elementary and Intermediate Learners", Cambridge University Press, New York, 2003
3. Michael McCarthy and Felicity O Dell, "English Vocabulary in Use: Upper Intermediate", Cambridge University Press, N.York, 2012
4. Lakshmi Narayanan, "A Course Book on Technical English",Scitech Publications (India) Pvt. Ltd. 2020

* SDG- 04- Quality Education

Rev. No.1/w.e.f. 19/07/2025
Approved Passed in BoS Meeting held on 18/06/2025
in Academic Council Meeting held on 19/07/2025

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Tiruchengode - 637 215

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Fundamentals of Communication**	
1.1	Listening for General Information and Specific Details	1
1.2	Self-Introduction	1
1.3	Narrating Personal Experiences	1
1.4	Reading Relevant to Technical Contexts and Emails	1
1.5	Writing Letters – Informal	1
1.6	Writing Letters – Formal	1
1.7	Present Tenses	1
1.8	Synonyms, Antonyms and Contranyms, and Affixes	1
1.9	Phrasal Verbs; Abbreviations & Acronyms	1
2.0	**Narration And Summation**	
2.1	Listening To Podcasts, Documentaries and Interviews with Celebrities	1
2.2	Narrating Personal Experiences	1
2.3	Summarizing of Documentaries	1
2.4	Reading Travelogues, and Excerpts from Literature	1
2.5	Paragraph Writing	1
2.6	Short Report on an Event (Field Trip Etc.).	1
2.7	Past Tenses	1
2.8	Prepositions	1
2.9	One-Word Substitution	1
3.0	**Description of a Process / Product**	
3.1	Listen to a Product and Process Descriptions	1
3.2	Picture Description	1
3.3	Giving Instruction to use the Product	1
3.4	Reading Advertisements, Gadget Reviews and User Manuals	1
3.5	Writing Definitions and Instructions	1
3.6	Future Tenses	1
3.7	Homonyms and Homophones	1
3.8	Imperatives	1
3.9	Comparative Adjectives, and Discourse Markers	1
4.0	**Classification and Recommendations**	
4.1	Listening to TED Talks and Educational Videos	1
4.2	Listening to Scientific Lectures	1
4.3	Small Talk and Mini Presentations	1
4.4	Reading Newspaper Articles and Journal Reports	1
4.5	Note-Making / Note-Taking	1
4.6	Recommendations	1
4.7	Transferring Information from Non-Verbal	1
4.8	Articles and Pronouns	1
4.9	Subject-Verb Agreement and Collocations	1
5.0	**Expression**	
5.1	Listening to Debates and Panel Discussions	1
5.2	Group Discussions	2
5.3	Role Plays	1
5.4	Reading Editorials and Opinion Blogs	1
5.5	Essay Writing (Descriptive or Narrative)	1
5.6	Punctuation and Cause & Effect Expressions.	1
5.7	Compound Nouns	1
5.8	Simple, Compound & Complex Sentences	1

Course Designer(s)

Dr.A.Palaniappan- palaniappan@ksrct.ac.in

Rev. No.1/w.e.f. 19/07/2025
Approved Passed in BoS Meeting held on 18/06/2025
in Academic Council Meeting held on 19/07/2025

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60 MA 001	Matrices and Calculus	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To familiarize the basic concepts in Cayley-Hamilton theorem and orthogonal transformation
- To get exposed to the fundamentals of differentiation
- To acquire skills to understand the concepts involved in Jacobians and maxima and minima
- To solve various linear differential equations and method of variation of parameters
- To learn various techniques and methods in solving definite and indefinite integrals

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the concepts of Cayley-hamilton theorem and orthogonal transformation to the matrix	Apply
CO2	Apply the concepts of differentiation in solving various Engineering problems	Apply
CO3	Obtain Jacobians and maxima and minima of functions of two variables	Apply
CO4	Employ various methods in solving differential equations	Apply
CO5	Apply different techniques to evaluate definite and indefinite integrals	Apply

Mapping with Programme Outcomes

COs	POs											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	40	40	70
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 MA 001 –Matrices and Calculus								
Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT, AI&DS, AI&ML								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	40	60	100

Matrices Characteristic Equation – Eigen Values And Eigen Vectors Of A Real Matrix – Properties Of Eigen Values And Eigen Vectors – Cayley-Hamilton Theorem-Orthogonal Transformation of a Symmetric Matrix to Diagonal Form – Reduction of Quadratic form to Canonical form by an Orthogonal Transformation – Nature of Quadratic Form – Applications: Stretching of an Elastic Membrane. **Hands-On:** **Matrix Operations - Addition, Multiplication, Transpose, Inverse and Rank**	[9]
Differentiation Representation of Functions - Limit of a Function - Continuity - Derivatives - Differentiation Rules (Sum, Product, Quotient, Chain Rules) - Successive Differentiation - Leibnitz's Theorem **- Applications: Maxima and Minima of Functions of one Variable*** **Hands-on:** **Determine the Solution of System of Linear Equations**	[9]
Functions of Several Variables Partial Differentiation - Homogeneous Functions and Euler's Theorem - Jacobians - Taylor's Series for Functions of Two Variables - **Applications: Maxima and Minima of Functions of Two Variables - Constrained Maxima and Minima: Lagrange's Method of Undetermined Multipliers*** **Hands-on:** **Compute the Eigen Values and Eigen Vectors of a Matrix**	[9]
Differential Equations Linear Differential Equations of Second and Higher Order with Constant Coefficients - R.H.S is of the Form $e^{\alpha x}$, $\sin \alpha x$, $\cos \alpha x$, x^n, $n > 0$ - Differential Equations with Variable Coefficients: Cauchy's and Legendre's Form of Linear Equations - Method of Variation of Parameters **Hands-on:** **Solve the First and Second Order Ordinary Differential Equations**	[9]
Integration Definite and Indefinite Integrals - Substitution Rule - Techniques of Integration: Integration by Parts, Integration of Rational Functions by Partial Fraction, Integration of Irrational Functions - Improper Integrals - Applications: Hydrostatic Force and Pressure, Moments and Centers of Mass **Hands-on:** **Compute the Maxima and Minima of a Function of One Variable**	[9]
Total Hours: 45 + 5 (Hands-on) + 10 (Tutorial)	60

Text Book(s):

1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.

Reference(s):

1.	Dass H. K, "Higher Engineering Mathematics", 3rd (Revised) Edition, S.Chand & Company Ltd, New Delhi, 2014.
2.	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.
3.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand & Company Ltd, New Delhi, 2017.
4.	Bali N P and Manish Goyal, "A Text Book of Engineering Mathematics",10th Edition, Laxmi Publications (P) Ltd, 2016.

* SDG- 04- Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Matrices**	
1.1	Characteristic Equation	1
1.2	Eigen Values and Eigen Vectors of a Real Matrix	1
1.3	Properties of Eigen Values and Eigen Vectors	1
1.4	Cayley-Hamilton Theorem	1
1.5	Orthogonal Transformation of a Symmetric Matrix to Diagonal Form	1
1.6	Nature of Quadratic Form	1
1.7	Reduction of Quadratic Form to Canonical Form by Orthogonal Transformation	2
1.8	Stretching of An Elastic Membrane	1
1.9	Tutorial	2
1.10	Hands-On	1
2.0	**Differentiation**	
2.1	Representation of Functions	1
2.2	Limit of a Function and Continuity	1
2.3	Differentiation Rules (Sum, Product, Quotient, Chain Rules)	2
2.4	Successive Differentiation	1
2.5	Leibnitz's Theorem	2
2.6	Maxima and Minima of Functions of One Variable	2
2.7	Tutorial	2
2.8	Hands-On	1
3.0	**Functions of Several Variables**	
3.1	Partial Differentiation	1
3.2	Homogeneous Functions and Euler's Theorem	1
3.3	Jacobians	2
3.4	Taylor's Series for Functions of Two Variables	1
3.5	Maxima And Minima of Functions of Two Variables	2
3.6	Lagrange's Method of Undetermined Multipliers	2
3.7	Tutorial	2
3.8	Hands-on	1
4.0	**Differential Equations**	
4.1	Linear Differential Equations of Second and Higher Order with Constant Co-Efficient	1
4.2	R.H.S Is of the Form e^{ax}, $\sin \alpha x$, $\cos \alpha x$, $x^n, n > 0$	2
4.3	Differential Equations with Variable Coefficients: Cauchy's Form of Linear Equations	2
4.4	Differential Equations with Variable Coefficients: Legendre's Form of Linear Equations	2
4.5	Method Of Variation of Parameters	2
4.6	Tutorial	2
4.7	Hands-On	1
5.0	**Integration**	
5.1	Definite and Indefinite Integrals	2
5.2	Substitution Rule	1
5.3	Techniques of Integration: Integration by Parts	1
5.4	Integration of Rational Functions by Partial Fraction	1
5.5	Integration of Irrational Functions	1
5.6	Improper Integrals	1
5.7	Hydrostatic Force.	1
5.8	Pressure, Moments and Centres of Mass.	1
5.9	Tutorial	2
5.10	Hands-on	1
	Total	**60**

Course Designer(s)

1. Dr.C.Chandran–cchandran@ksrct.ac.in
2. Mr.G.Mohan - mohang@ksrct.ac.in

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60 CH 004	Engineering Chemistry (Common to CS, IT, AD, AM)	Category	L	T	P	Credit
		BS	3	0	0	3

Objectives

- To bestow a better understanding of basic concepts of chemistry and its applications
- To imparts the knowledge on the concepts of electrochemistry and its applications
- To explain the characteristics and application of chemical sensors in software engineering
- To study the working principles of smart materials and its applications
- To learn the concepts of cheminformatics

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the types of hardness of water and its removal.	Apply
CO2	Interpret the applications of electro chemistry.	Understand
CO3	Categorize the types of sensors for various applications.	Apply
CO4	Identify the properties, principles, and applications of various smart materials in modern technologies.	Understand
CO5	Illustrate the significance of cheminformatics in drug development.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	2	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Terminal Examination (Marks)
	1	2	
Remember	20	20	20
Understand	30	30	60
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

60 CH 004 – Engineering Chemistry

Common to CS, IT,AD,AM

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Water Technology* Introduction – Commercial and Industrial uses of Water - Hardness - Types – Estimation of Hardness by Edta Method- Internal Conditioning (Colloidal, Phosphate, Calgon and Carbonate Conditioning Methods) – External Conditioning (Zeolite Process, Demineralization Process) - Desalination Methods (Reverse Osmosis And Electro Dialysis). Flash Evaporation.	[9]
Electrochemistry ** Electrode Potential - Nernst Equation - Derivation and Problems - Reversible and Irreversible Cells - Types of Electrodes and Its Applications - Reference Electrodes - Ph, Conductometric and Potentiometric Titrations - Principles of Electro Plating and Electro Less Plating- Fabrication Process of Printed Circuit Board.	[9]
Chemical Sensors** Sensors – Chemical Sensors – Characteristics – Elements and Characterization - Potentiometric Sensors - Amperometric Sensors – Sensors Based on Electrochemical Methods – Electrochemical Biosensors – Optical Biosensors: Enzyme Sensors – Bio Affinity Sensors - DNA Sensors. Chemical Sensors as Detectors and Indicators: Indicators for Titration Processes – Separation Methods. Nano Technology in Chemical Sensors.	[9]
Smart Materials** Liquid Crystal Polymers - Organic Light Emitting Diode (Oled) - [Polythiopene] - Working and Applications – Conductive Polymers and Semi Conducting Polymers: Principle and Applications- Organic: Organic Dielectric Material [Polystyrene, Pmma]. Smart Screen Materials: Inorganic Rare Earth Metals [Yttrium, Lanthanum, Cerium] - Conductive Components: Indium Tin Oxide [Properties and Applications] - Touch Screen [Resistive and Capacitive] - Magnetic Storage [Iron Oxide, Cobalt Alloy] – Optical Storage [Photo Chromic Materials] - Solid Storage.	[9]
Cheminformatics** Definition – Coordinate –Bonds –Bond Length – Bond Angles – Torsional Angles – Chemical Structure – Definition - Conformation – Representation Of Structural Information – Linear Format – Smileyf Notation – Mol Format – Pdb Format – Storage Of Structural Data in A Database - Structural Keys – Finger Print -Canonical Structure using Chemdraw – Similarity Search –Sub Structure Search - Application of Chem-Informatics in Drugs Designing.	[9]
Total Hours:	**45**

Text Book(s):

1.	Palanna O.G. “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2017.

Reference(s):

1.	Jain P.C. and Monica Jain, “Engineering Chemistry”, Dhanpatrai publishing co. New Delhi, 14th edition, 2015.
2.	Peter Grundler “Chemical Sensors” ISBN 978-3-540-45742-8 Springer Berlin Heidelberg New York, 2007
3.	Roussak O.V. and Gesser H.D., “Applied Chemistry-A Text Book for Engineers and Technologists”, Springer Science Business Media, New York, 2nd Edition, 2013.
4.	Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2nd Edition, 2019.

* SDG 6: Improve Clean Water and Sanitation

** SDG 9 Industry, Innovation and Infrastructure

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Water Technology**	
1.1	Introduction – Commercial and Industrial uses of Water	1
1.2	Hardness - Types	1
1.3	Estimation of Hardness of Water by EDTA Method	1
1.4	Internal Conditioning (Colloidal, Phosphate, Calgon and Carbonate)	1
1.5	External Conditioning (Zeolite Process & Demineralization Process)	1
1.6	Desalination Methods (Reverse Osmosis and Electro Dialysis)	1
1.7	Desalination Methods (Reverse Osmosis)	1
1.8	Electro dialysis	1
1.9	Flash Evaporation	1
2.0	**Electrochemistry**	
2.1	Electrode Potential - Nernst Equation - Derivation and Problems	2
2.2	Reversible and Irreversible Cells	1
2.3	Types of Electrodes and its Applications	1
2.4	Reference Electrodes - pH	1
2.5	Conductometric and Potentiometric Titrations	1
2.6	Principles of Electro Plating and Electro Less Plating	2
2.7	Fabrication Process of Printed Circuit Board.	1
3.0	**Chemical Sensors**	
3.1	Sensors – Chemical Sensors - Characteristics	1
3.2	Elements and Characterization	1
3.3	Potentiometric Sensors, Amperometry Sensors	1
3.4	Sensors Based on Electrochemical Methods	1
3.5	Electrochemical Biosensors	1
3.6	Optical Biosensors : Enzyme Sensors – Bio Affinity Sensors	1
3.7	DNA Sensors, Chemical Sensors as Detectors and Indicators	1
3.8	Indicators for Titration Processes	1
3.9	Separation Methods, Nano technology in Chemical Sensors.	1
4.0	**Smart Materials**	
4.1	Liquid Crystal Polymers - Organic Light Emitting Diode (OLED) - Polythiopene - Working and Applications	2
4.2	Conductive Polymers and Semi Conducting Polymers: Principle and Applications	1
4.3	Organic : Organic Dielectric Material [Polystyrene, PMMA].	1

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4.4	Smart Screen Materials : Inorganic Rare Earth Metals [Yttrium, Lanthanum, Cerium]	2
4.5	Conductive Components: Indium Tin Oxide [Properties and Applications] - Touch Screen [Resistive and Capacitive]	1
4.6	Magnetic Storage [Iron Oxide, Cobalt Alloy]	1
4.7	Optical Storage [Photo Chromic Materials] - Solid Storage.	1
5.0	**Cheminformatics**	
5.1	Definition - Coordinate - Bonds - Bond Length - Bond Angles - Torsional Angles - Chemical Structure	2
5.2	Definition - Conformation - Representation of Structural Information	2
5.3	Linear Format - SMILEY Notation - MOL Format - PDB Format	1
5.4	Storage of Structural Data in a Database - Structural Keys	1
5.5	Finger Print - Canonical Structure using Chemdraw	1
5.6	Similarity Search - Sub Structure Search -	1
5.7	Application of Chem - Informatics in Drugs Designing	1
	Total	**45**

Course Designer(s)

- Dr.T.A.Sukantha - sukantha@ksrct.ac.in
- Dr.B.Srividhya - srividhya@ksrct.ac.in
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60 ME 002	Engineering Graphics	Category	L	T	P	Credit
		ES	2	0	4	4

Objectives

- To acquire various concepts of dimensioning, conventions and standards.
- To impart the graphic skills for converting pictorial views of solids in to orthographic views.
- To learn the concept in projection of solids, section of solids and development of different types of surfaces.
- To learn the concept of isometric projection.
- To learn the geometry and topology of engineered components

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the Impact of computer technologies on graphical communication	Apply
CO2	Convert the pictorial views in to orthographic views using drafting software	Apply
CO3	Draw the projection of simple solids, true shape of sections and development of surfaces	Apply
CO4	Construct the isometric projections of objects using drafting software.	Apply
CO5	Interpret a design project illustrating engineering graphical skills.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	-	3	-	-	3	-	-	-	-	3	3	-
CO4	3	3	3	-	3	-	-	3	-	-	-	-	3	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	2	2	-
	3 - Strong; 2 - Medium; 1 - Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 ME 002 – Engineering Graphics								
Common to CS, IT, EE, EC, BT, FT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	2	0	4	90	4	40	60	100

Introduction To Computer Aided Drafting (CAD) Software Theory of CAD Software – Menu System, Tool Bars (Standard, Object Properties, Draw, Modify and Dimension) – Drawing Area (Background, Crosshairs, Coordinate System) – Dialog Boxes and Windows – Shortcut Menus (Button Bars) – The Command Line and Status Bar – Different Methods of Zoom – Select and Erase Objects	[6+12]
Orthographic Projection* Theory of Projection – Terminology and Methods of Projection – First Angle and Third Angle Projection – Conversion of Pictorial Views into Orthographic Views	[6+12]
Projection Of Solids And Sections Of Solids* Projections of Simple Solids: Prism, Pyramid, Cylinder and Cone (Axis Parallel to One Plane and Perpendicular to other, Axis Inclined to one Plane and Parallel to other). Sections of Simple Solids: Prism, Pyramid, Cylinder and Cone in Simple Positions (Cutting Plane is Inclined to one of the Principal Planes and Perpendicular to the other) – True Shape of Sections **Development Of Surfaces** Principle of Development-Methods of Development: Parallel Line Development-Cube, Prism and Cylinder. Radial Line Development – Pyramid and Cone	[6+12]
Isometric Projection Principles of Isometric Projection – Isometric Scale, Isometric Views, Conventions – Isometric Views of Lines, Planes, Simple and Compound Solids – Conversion of Orthographic Views in to Isometric View	[6+12]
Application Of Engineering Graphics Geometry and Topology of Engineered Components: Creation of Engineering Models and their Presentation in Standard 2D Blueprint Form, 3D Wire-Frame and Shaded Solids – Geometric Dimensioning and Tolerance – Use of Solid Modeling Software for Creating Associative Models – Floor Plans: Windows, Doors, and Fixtures such as Water Closet (WC), Bath Sink, Shower, etc. – Applying Colour Coding According to Building Drawing Practice – Drawing Sectional Elevation Showing Foundation to Ceiling – Introduction to Building Information Modelling (BIM).	[6+12]
Total Hours:	**90**

Text Book(s):	
1.	Bhatt N.D., “Engineering Drawing”, Charotar Publishing House Pvt. Ltd., 53rd Edition, Gujarat, 2019.
2.	Venugopal K., “Engineering Graphics II”, New Age International (P) Limited, 2014.
Reference(s):	
1.	Shah M.B., Rana B.C., and V.K.Jadon., “Engineering Drawing II”, Pearson Education, 2011.
2.	Natarajan K.V., “A Text Book of Engineering Graphics II”, Dhanalakshmi Publishers, Chennai, 2014.
3.	Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill Education, 2013.
4.	Dhawan, R.K., “A Text Book of Engineering Drawing” 3 rd Revised Edition, S. Chand Publishing, New Delhi, 2012.

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction to Computer Aided Drafting (CAD) Software**	
1.1	Theory of CAD Software	1
1.2	Menu System, Tool Bars (Standard, Object Properties, Draw, Modify and Dimension)	4
1.3	Drawing Area (Background, Crosshairs, Coordinate System)	4
1.4	Dialog Boxes and Windows – Shortcut Menus	4
1.5	The Command Line and Status Bar	1
1.6	Different Methods of Zoom – Select and Erase Objects	4
2.0	**Orthographic Projection**	
2.1	Introduction to Orthographic Projections	2
2.2	Planes of Projection	2
2.3	Projection of Points	2
2.4	Projection of Lines Inclined to Both Planes	2
2.5	Projection of Planes	2
2.6	Projection of Planes Inclined to Both Planes	2
2.7	Conversions of Pictorial Views to Orthographic Views	2
2.8	Practice Class for Pictorial Views to Orthographic Views	2
2.9	Practice Class for Pictorial Views to Orthographic Views	2
3.0	**Projection of Solids, Sections of Solids and Development of Surfaces**	
3.1	Projections of Simple Solids: Prism	1
3.2	Projections of Simple Solids: Cylinder	1
3.3	Projections of Simple Solids: Pyramid	1
3.4	Projections of Simple Solids: Cone	1
3.5	Practice Class for Projection of Solids	1
3.6	Axis Of Solid Inclined to both HP and VP	2
3.7	Section of Solids for Prism	1
3.8	Section of Solids for Cylinder	1
3.9	Section of Solids for Pyramid	1
3.10	Section of Solids for Cone	1
3.11	Auxiliary Views – Draw the Sectional Orthographic Views of Geometrical Solids	2
3..12	Draw the Sectional Orthographic Views of Objects from Industry	1
3.13	Development of Surfaces of Right Solids Prism	1
3.14	Development of Surfaces of Right Solids Pyramid	1
3.15	Development of Surfaces of Right Solids Cylinder and Cone	2
4.0	**Isometric Projection**	
4.1	Principles of Isometric Projection	2
4.2	Isometric Scale	2
4.3	Isometric Projections of Simple Solids: Prism	2

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4.4	Isometric Projections of Simple Solids: Pyramid	2
4.5	Isometric Projections of Simple Solids: Cylinder	2
4.6	Isometric Projections of Simple Solids: Cone	2
4.7	Isometric Projections of Frustum	2
4.8	Isometric Projections of Truncated Solids	2
4.9	Combination of Two Solid Objects in Simple Vertical Positions	2
5.0	**Application Of Engineering Graphics**	
5.1	Geometry and Topology of Engineered Components	2
5.2	Creation of Engineering Models and their Presentation in Standard 2D Blueprint Form	2
5.3	3D Wire-Frame and Shaded Solids - Geometric Dimensioning and Tolerance - Use Of Solid Modeling Software for Creating Associative Models	4
5.4	Floor Plans: Windows, Doors and Fixtures Such As Water Closet (WC), Bath Sink, Shower,Etc.	2
5.5	Applying Colour Coding According to Building Drawing Practice	2
5.6	Drawing Sectional Elevation Showing Foundation to Ceiling	4
5.7	Introduction to Building Information Modelling (BIM)	2

Course Designers

1. Dr.K.Mohan-mohank@ksrct.ac.in

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60 CS 001	C Programming	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To learn most fundamental element of the C language and to examine the execution of branching, looping statements
- To examine the concepts of arrays, its characteristics and types and strings.
- To understand the concept of functions, pointers and the techniques of putting them to use
- To apply the knowledge of structures and unions to solve basic problems in C language
- To enhance the knowledge in file handling functions for storage and retrieval of data

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Construct the fundamental building blocks of structured Programming in C	Apply
CO2	Implement the different operations on arrays and strings	Apply
CO3	Develop simple real world applications utilizing functions, recursion and pointers.	Apply
CO4	Demonstrate the concepts of structures, unions, user defined data types and pre-processor	Apply
CO5	Interpret the file concepts using proper standard library functions for a given application	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO2	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO3	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO4	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO5	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	20
Apply	40	40	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
60 CS001– C Programming								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	3	0	0	45	3	40	60	100

Basics of C, I/O, Branching and Loops* Structure of a C Program - Data types - Keywords - Variables - Type Qualifiers - Constants - Operators - Expressions and Precedence - Console I/O - Unformatted and Formatted Console I/O - Conditional Branching and Loops - Writing and Evaluation of Conditionals and Consequent Branching	[9]
Arrays and Strings* Arrays: One Dimensional Arrays - Two Dimensional Arrays - Matrix Manipulation - Character Arrays -Strings: String Manipulation with and without String Handling Functions.	[7]
Functions and Pointers* Functions: Scope of A Function – Library Functions and User Defined Functions – Function Prototypes - Call by Value and Call by Reference - Function Categorization- Arguments to Main Function - Recursion and Application - Passing Arrays to Functions - Storage Class Specifiers. Introduction to Pointer Variables – The Pointer Operators – Pointer Expressions – Pointers and Arrays – Generating a Pointer to an Array – Indexing Pointers– Function and Pointers – Dynamic Memory Allocation.	[11]
Structures, Unions, Enumerations, Typedef and Preprocessors* Structures - Introduction to Structures and Initialization - Arrays of Structures- Arrays and Structures, Nested Structures - Passing Structures to Functions - Structure Pointers - Unions - Bit Fields - Enumerations - Typedef - The Preprocessor and Commands.	[9]
File Handling* File: Streams - Reading and Writing Characters – Reading and Writing Strings - File System Functions - File Manipulation - Sequential Access - Random Access Files - Command Line arguments.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Herbert Schildt, “The Complete Reference C”, Fourth Edition, Tata McGraw Hill Edition, 2010.
2.	Byron Gottfried, “Programming with C”, Third Edition, McGraw Hill Education, 2014.
Reference(s):	
1.	Balagurusamy E, “Programming in ANSI C”, Seventh Edition, Tata McGraw Hill Edition, New Delhi, 2016.
2.	Brian W. Kernighan and Dennis M. Ritchie, “C Programming Language”, Prentice-Hall.
3.	Reema Thareja, “Computer Fundamentals and Programming in C”, Second Edition, Oxford Higher Education, 2016.
4.	King K N, “C Programming: A Modern Approach”, Second Edition, W.W.Norton, New York, 2008.

*SDG:4- Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basics of C, I/O, Branching and Loops**	
1.1	Structure of a C Program, Keywords	1
1.2	Data Types, Type Qualifiers	1
1.3	Variables and Constants	1
1.4	Operators - Expressions and Precedence	1
1.5	Console I/O– Unformatted and Formatted Console I/O	1
1.6	Conditional Branching	1
1.7	Iteration and Loops	2
1.8	Writing and Evaluation of Conditionals and Consequent Branching	1
2.0	**Arrays and Strings**	
2.1	One Dimensional Array	1
2.2	Two - Dimensional Array and Matrix Manipulation	1
2.3	Character Arrays and Strings Basics	2
2.4	String Manipulation without String Handling Functions	2
2.5	String Manipulation with String Handling Functions	1
3.0	**Functions and Pointers**	
3.1	Scope of a Function – Library Functions, User Defined Functions and Function Prototypes	1
3.2	Function Call by Value and Function Call by Reference, Function Categorization	2
3.3	Arguments to Main Function	1
3.4	Recursion and Application	1
3.5	Passing Arrays to Functions	1
3.6	Storage Class Specifiers	1
3.7	Introduction to Pointer Variables - The Pointer Operators - Pointer Expressions	1
3.8	Pointers and Arrays - Generating a Pointer to an Array - Indexing Pointers	1
3.9	Function and Pointers	1
3.10	Dynamic Memory Allocation	1
4.0	**Structures, Unions, Enumerations, Typedef and Pre-Processors**	
4.1	Introduction to Structures and Initialization	1
4.2	Arrays and Structures, Arrays of Structures	1
4.3	Structures within Structures, Passing Structures to Functions	2
4.4	Structure Pointers	1
4.5	Unions and Bit Fields.	1
4.6	Enumerations -Typedef	1
4.7	Pre - Processor Commands	2
5.0	**File Handling**	
5.1	File Streams - Reading and Writing Characters - Reading and Writing Strings	2
5.2	File System Functions and File Manipulation	2
5.3	Sequential Access	2
5.4	Random Access Files	2
5.5	Command Line Arguments and Files	1
	Total Hours:	45

Course Designer(s)

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60 MY 001	Environmental Studies and Climate Change (Common to All)	Category	L	T	P	Credit
		MC	2	0	0	0

Objectives

- To understand the impact climate changes in ecosystem and biodiversity.
- To Analyse the impacts of pollution, control and legislation.
- To explain the importance of sustainable development practices.
- To explore the significance of organic farming.
- To identify the Geo-spatial tools for resource management.

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the impacts of pollution on climate change	Understand
CO2	Categorize the wastes and its management	Analyse
CO3	Identify the different types of sustainable practices	Apply
CO4	Classify the organic farming techniques	Apply
CO5	Categorize the Geo-spatial tools for resource management	Analyse

Mapping with Programme Outcomes

COs	POs													PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	3	-	-	-	-	2	-	-	-
CO2	3	2	-	-	-	3	3	2	-	-	-	2	-	-	-
CO3	3	2	-	-	-	3	3	2	-	-	-	2	-	-	-
CO4	3	2	-	-	-	2	3	-	-	-	-	2	-	-	-
CO5	3	2	-	-	3	-	2	-	-	-	-	2	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	`Continuous Assessment Tests (30 Marks)		Quiz (20 marks)		Seminar presentation (50 marks)
	1	2			
	Case Study	Activity Report	Quiz 1	Quiz 2	
Remember	10	10	5	5	10
Understand	30	30	10	10	15
Apply	-	-	-	5	15
Analyse	20	20	5	-	10
Evaluate	-	-	-		-
Create	-	-	-		-
Total	**60**	**60**	**20**	**20**	**50**

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
60 MY 001 - Environmental Studies and Climate Change								
Common to All								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	2	0	0	30	0	100	-	-

Pollution and its Impact on Climate Change* Pollution: Sources and Impacts of Air Pollution – Greenhouse Effect- Global Warming- Climate Change - Ozone Layer Depletion - Acid Rain. Carbon Footprint - Climate Change on Various Sectors – Agriculture, Forestry and Ecosystem – Climate Change Mitigation and Adaptation. Action Plan on Climate Change. IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes.	[6]
Integrated Waste Management ** Waste – Types and Classification. Principles o f Waste Management (5R Approach) - Swachh Bharat Abhiyan – Commercial Waste, Plastic Waste, Domestic Waste, E-Waste - Biomedical Waste - Risk Management: Collection, Segregation, Treatment and Disposal Methods. Waste Water Treatment- Activate Sludge Process.	[6]
Sustainable Development Practices§ Sustainable Development Goals (Sdgs) **–** Green Computing- Carbon Trading - Green Building – Eco- Friendly Plastic – Alternate Energy: Hydrogen – Bio-Fuels – Solar Energy – Wind – Hydroelectric Power. Water Scarcity- Watershed Management, Ground Water Recharge and Rainwater Harvesting.	[6]
Environment And Agriculture§§ Organic Farming – Bio-Pesticides- Composting, Bio Composting, Vermi- Composting, Roof Gardening and Irrigation. Waste Land Reclamation. Climate Resilient Agriculture. Green Auditing	[6]
Geo-Science In Natural Resource Management Data Base Software in Environment Information- Digital Image Processing Applications in Forecasting. GPS - Remote Sensing and Geographical Information System (GIS) -World Wide Web (WWW) - Environmental Information System (ENVIS).	[6]
Total Hours:	**30**

Text Book(s):	
1.	Anubha Kaushik , Kaushik C P. “Perspectives in Environmental Studies”, New Age International publishers; Sixth edition (1 January 2018)
Reference(s):	
1.	Tyler Miller G , “Environmental Science” 14th Edition Cengage Publications, Delhi, 2013
2.	Gilbert M.Masters and Wendell P. Ela, “Environmental Engineering And Science”, Phi Learning Private Limited, 3rd Edition,2015
3.	ErachBharucha, “Textbook of Environmental Studies for Undergraduate Courses”, Universities Press, 2000

*SDG: 13 – Climate Action

**SDG: 4 – Clean Water and Sanitation

***SDG: 6 - Affordable and Clean Energy

****SDG: 3 – Good Health and Well-being

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Pollution and Its impact on Climate Change**	
1.1	Pollution: Sources and Impacts of Air Pollution – Greenhouse Effect- Global Warming- Climate Change - Ozone Layer Depletion - Acid Rain	2
1.2	Climate change on various sectors: Agriculture, forestry and ecosystem. – climate change mitigation and adaptation	2
1.3	Action plan on climate change - IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol on Climatic Changes	2
2.0	**Integrated Waste Management**	
2.1	Waste - Types and Classification. Principles of Waste Management (5R Approach) - Swachh Bharat Abhiyan	2
2.2	Commercial Waste, Plastic Waste, Domestic Waste, E-Waste and Biomedical Waste	2
2.3	Risk Management: Collection, Segregation, Treatment and Disposal Methods.	2
3.0	**Sustainable Development Practices**	
3.1	Sustainable Development Goals (Sdgs) **-** Green Computing - Carbon Trading - Green Building - Eco- Friendly Plastic	2
3.2	Alternate Energy: Hydrogen - Bio-Fuels - Solar Energy - Wind - HydroElectric Power	2
3.3	Water Scarcity- Watershed Management, Ground Water Recharge and Rainwater Harvesting	2
4.0	**Environment and Agriculture**	
4.1	Organic Farming - Bio - Pesticides	2
4.2	Composting, Bio Composting, Vermi - Composting	1
4.3	Roof Gardening and Irrigation	1
4.4	Waste Land Reclamation, Climate Resilient Agriculture, Green Auditing	2
5.0	**Geo-Science in Natural Resource Management**	
5.1	Data Base Software in Environment Information, Digital Image Processing Applications in Forecasting	2
5.2	GPS, Remote Sensing and Geographical Information System (GIS)	2
5.3	World Wide Web (WWW), Environmental Information System (ENVIS)	2
	Total Hours	**30**

Course Designer(s)

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3. Dr.S.Meenachi - meenachi@ksrct.ac.in
4. Ms.D.Kirthiga - kiruthiga@ksrct.ac.in

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61 GE 001	தமிழர் மரபு (அனைத்து துறைகளுக்கும் பொதுவானது)	Category	L	T	P	Credit
		GE	1	0	0	1*

பாடத்தின் நோக்கங்கள்:

- தமிழ் மொழியின் இலக்கணச் செறிவைக் கற்றுணர்தல்.
- தமிழர் பண்பாட்டின் நுண்கலைகள் பற்றிய ஒரு மீள்பார்வை.
- இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்களிப்பை உணருதல்.

முன்கூட்டிய துறைசார் அறிவு:

தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்:

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	தமிழ் மொழியின் செந்தண்மை மற்றும் இலக்கியம் குறித்த தெரிதல்.	புரிதல்
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக்கருவிகள் குறித்த தெளிவு.	புரிதல்
CO3	தமிழர்களின் நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு.	புரிதல்
CO4	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதையை இயக்கம் மற்றும் சித்த மருத்துவம் பற்றிய புரிதல்.	புரிதல்

Mapping with Programme Outcomes

POs												PSOs		
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	End Sem Examination (Marks)
	1	
Remember	50	30
Understand	50	30
Apply	-	40
Analyse	-	-
Evaluate	-	-
Create	-	-
Total	100	100

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61 GE 001	Heritage of Tamils	Category	L	T	P	Credit
		GE	1	0	0	1*

Objectives

- To learn the extensive literature of classical Tamil
- To review the fine arts heritage of Tamil culture
- To realize the contribution of Tamils in Indian freedom struggle

Pre-requisites

NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recognize the extensive literature of Tamil and its classical nature.	Understand
CO2	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	Understand
CO3	Review on folk and martial arts of Tamil people.	Understand
CO4	Insight thinai concepts, trade and victory of Chozha dynasty.	Understand
CO5	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	Understand

Mapping with Programme Outcomes

POs												PSOs		
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-
3	-	-	-	-	-	3	3	-	2	-	3	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	End Sem Examination (Marks)
	1	
Remember	50	30
Understand	50	30
Apply	-	40
Analyse	-	-
Evaluate	-	-
Create	-	-
Total	100	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022

61 GE 001 – தமிழர் மரபு *(அனைத்து துறைகளும் பொதுவானது)*

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	0	15	1#	40	60	100

மொழி, இலக்கியம், வாழ்க்கைத் திறன்கள் மற்றும் நெறிமுறைகள்:* இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள் - தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு. வாழ்வியல், பொறுப்புணர்வு, சுய ஆய்வு, மனோபாவம், தன்னம்பிக்கை, இலக்குகள், உறவுகள், தலைமைப்பண்பு, பாலின சமநிலை.	[3]
மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை- சிற்பக் கலை. * நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.	[3]
நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுள்: * தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து சிலம்பாட்டம், வளரி, புளியாட்டம், தமிழர்களின் விளையாட்டுகள் .	[3]
தமிழர்களின் திணைக் கோட்பாடுகள்: * தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி .	[3]
இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: * இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு.	[3]
Total Hours	**15**

Text Book(s):

1.	முனைவர் பிள்ளை கே. கே., தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed ,2022.
2.	முனைவர் சுந்தரம் இல., கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed,2021
3.	முனைவர் சிவானந்தம் இரா., சேரன் மு., கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed,2020.
4.	முனைவர் சிவானந்தம் இரா. , முனைவர் பாஸ்கர் ஜெ., பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed ,2022
5.	ஈரோடு கதிர், உயர்தல் உரிமை, சிக்ஸ் ப்ளஸ் ஒன் ட்ரெயினிங் அகாடமி,1st Ed,2024
6.	Dr.Pillay K.K., Social Life of Tamils, TNTB & ESC and RMRL – (In print).
7.	Dr. Singaravel S., Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st, 2001.
8.	Dr. Subaramanian S.V., Dr. Thirunavukkarasu K.D., Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd, 2010
9.	Dr. Valarmathi M., The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies,
10.	Dr. Sivanantham R., Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,
11.	Dr. Pillay K.K., Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
12.	Dr. Sivanantham R., Dr.Baskar J., Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
13.	Balakrishnan R., Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed ,2022

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022

61 GE 001 – Heritage of Tamils

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	0	0	15	1#	40	60	100

Language, Literature, Life Skills & Ethics* Language Families in India - Dravidian Languages - Tamil as a Classical Language - Classical Literature in Tamil - Secular Nature of Sangam Literature - Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan-Life, Responsibility, Self-exploration, Attitude, Self-confidence, Goals, Relationships, Leadership, Gender equality	[3]
Heritage - Rock Art Paintings to Modern Art – Sculpture* Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of Temple Car Making -Massive Terracotta Sculptures, Village Deities, Thiruvalluvar Statue at Kanyakumari, Making of Musical Instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.	[3]
Folk and Martial Arts* Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger Dance - Sports and Games of Tamils.	[3]
Thinai Concept of Tamils* Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.	[3]
Contribution Of Tamils To Indian National Movement And Indian Culture* Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the Other Parts of India - Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine - Inscriptions & Manuscripts - Print History Of Tamil Books.	[3]
Total Hours	**15**

Text Book(s):

1.	முனைவர் பிள்ளை கே. கே., தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 18th Ed ,2022.
2.	முனைவர் சுந்தரம் இல., கணினித்தமிழ்,விகடன் பிரசுரம், 2nd Ed,2021
3.	முனைவர் சிவானந்தம் இரா., சேரன் மு., கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு, 6th Ed,2020.
4.	முனைவர் சிவானந்தம் இரா. , முனைவர் பாஸ்கர் ஜெ., பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு,1st Ed ,2022
5.	ஈரோடு கதிர், உயர்தல் உரிமை, சிக்ஸ் ப்ளஸ் ஒன் ட்ரெயினிங் அகாடமி,1st Ed,2024
6.	Dr.Pillay K.K., Social Life of Tamils, TNTB & ESC and RMRL – (In print).
7.	Dr. Singaravel S., Social Life of the Tamils - The Classical Period, International Institute of Tamil Studies, 1st, 2001.
8.	Dr. Subaramanian S.V., Dr. Thirunavukkarasu K.D., Historical Heritage of the Tamils, International Institute of Tamil Studies, 2nd, 2010
9.	Dr. Valarmathi M., The Contributions of the Tamils to Indian Culture, International Institute of Tamil Studies.
10.	Dr. Sivanantham R., Keeladi - Sangam City Civilization on the banks of river Vaigai, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
11.	Dr. Pillay K.K., Studies in the History of India with Special Reference to Tamil Nadu, K.K. Pillay(Published by the Author.
12.	Dr. Sivanantham R., Dr.Baskar J., Porunai Civilization, Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation.
13.	Balakrishnan R., Journey of Civilization Indus to Vaigai, Roja Muthiah Research Library,3rd Ed ,2022

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Course Contents and Lecture Schedule		
S.No	**Topic**	**No. of Hours**
1.0	**Language and Literature**	
1.1	Language Families in India - Dravidian Languages – Tamil as a Classical Language	1
1.2	Classical Literature in Tamil – Secular Nature of Sangam Literature- Distributive Justice in Sangam Literature - Management Principles in Thirukural- Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars	1
1.3	Forms of Minor Poetry - Development of Modern Literature in Tamil - Contribution of Bharathiyar and Bharathidhasan- Life, Responsibility, Self-exploration, Attitude, Self-confidence, Goals, Relationships, Leadership, Gender equality	1
2.0	**Heritage - Rock Art Paintings to Modern Art – Sculpture**	
2.1	Hero Stone to Modern Sculpture - Bronze Icons - Tribes and Their Handicrafts - Art of Temple Car Making	1
2.2	Massive Terracotta Sculptures, Village Deities, Thiruvalluvar Statue at Kanyakumari, Making of Musical Instruments - Mridhangam	1
2.3	Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils	1
3.0	**Folk and Martial Arts**	
3.1	Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu	1
3.2	Oyillattam, Leatherpuppetry, Silambattam, Valari,	1
3.3	Tiger dance -Sports and Games of Tamils	1
4.0	**Thinai Concept of Tamils**	
4.1	Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature	1
4.2	Aram Concept of Tamils - Education and Literacy during Sangam Age	1
4.3	Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.	1
5.0	**Contribution of Tamils to Indian National Movement and Indian Culture**	
5.1	Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India	1
5.2	Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine	1
5.3	Inscriptions & Manuscripts – Print History of Tamil Books.	1
	Total	**15**

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61 ME 0P1	Fabrication and Reverse Engineering Laboratory (Common to all Branches)	Category	L	T	P	Credit
		ES	0	0	4	2

Objectives

- To provide hands-on training on Carpentry, Sheet metal, Fitting and Welding.
- To offer real time activity on plumbing connections and power tools in domestic applications.
- To provide hands-on training on CNC Wood Router and 3D Printing
- To provide hands-on training on household wiring and dismantling and assembling the home appliances.
- To offer real time activity on embedded programming using Arduino

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Make a wooden model using carpentry, Sheet metal Process.	Apply
CO2	Mate a model using filing and joining using MS Plate and repair & maintenances of water lines, power tools for home applications.	Apply
CO3	Cultivate the skills necessary for developing innovative and desirable products, including the ability to integrate user needs, market trends and technological advancement into the design process.	Apply
CO4	Trouble shoot the electrical and electronic circuits, electrical appliances and facilitate the house wiring.	Apply
CO5	Acquire practical knowledge on embedded programming using Arduino.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	-	-	2	2	-	3	-	-	3	-	3	3
CO2	3	2	3	-	-	2	2	-	3	-	-	3	-	3	3
CO3	3	2	3	-	-	2	2	-	3	-	-	3	-	3	3
CO4	3	-	3	-	-	2	2	-	3	-	-	3	-	3	3
CO5	3	-	3	-	-	2	2	-	3	-	-	3	-	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	25	12	50	50
Apply	25	13	50	50
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
(Common to All branches)								
61 ME 0P1 – Fabrication and Reverse Engineering Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

List of Experiments:

1. Making of Metal Model and Carpentry Process

a) Making of Tray using Sheet Metal Process

b) Making of T / Cross Joint using Carpentry Process.

2. Mating of Square Joint using the Filling Process

3. Fabrication of Welded model

4. Repair and Maintenance of Pipe Fitting for Home Applications

a) Assembly of GI pipes/PVC, Pipe Fitting and Cutting of Threads in GI pipes.

b) Fitting of Pipe with Clamps using Power Tools

5. Making of Model using CNC Wood Router

a) 2D profile cutting on plywood/MDF (6-12 mm) for press fit design

b) Machining of 3D geometry on soft material such as softwood

6. 3D Printing of scanned geometry using FDM or SLA Printer.

7. Dismantling and Assembling of

a) Iron Box

b) Mixer Grinder

c) Ceiling Fan

d) Table Fan

e) Water Heater

f) Induction Stove

8. Design and Execution of Residential house wiring with UPS.

a) 1 BHK

b) 2 BHK

9. Design and fabrication of domestic LED lamps

a) Schematic and PCB layout design of the given circuit and fabrication and testing of the same.

b) Soldering

10. Embedded programming using Arduino

Lab Manual

1.	"Fabrication and Reverse Engineering Laboratory Manual", Department of Mechanical Engineering, KSRCT.

***SDG 9 – Industry Innovation and Infrastructure**

Course Designer(s)

1. Mr.S Sakthivel - sakthivel_s@ksrct.ac.in
2. Dr.G.Vijayagowri – vijayagowri@ksrct.ac.in
3. Mr. K.Raguvaran – raguvaran@ksrct.ac.in

Lab Manual

1. "Fabrication and Reverse Engineering Laboratory Manual", Department of Mechanical Engineering, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. Mr.S Sakthivel - sakthivel_s@ksrct.ac.in
2. Dr. D Sri Vidya - srividhya@ksrct.ac.in
3. Mr. K. Raguvaran – raguvaran@ksrct.ac.in

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60 CS 0P1	C Programming Laboratory	Category	L	T	P	Credit
		ES	0	0	4	2

Objectives

- To enable the students to apply the concepts of C to solve simple problems
- To use selection and iterative statements in C programs
- To apply the knowledge of library functions in C programming
- To implement the concepts of arrays, functions, structures and pointers in C
- To implement the file handling operations through C

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement computational problems using selection and iterative statements	Apply
CO2	Demonstrate C program to manage collection of related data.	Apply
CO3	Design and implement different ways of passing arguments to functions, Recursion and implement pointers concepts.	Apply
CO4	Develop a C program to manage collection of different data using structures, Union, user-defined data types and pre-processor directives.	Apply
CO5	Demonstrate C program to store and retrieve data using file concepts.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO2	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO3	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO4	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
CO5	3	3	3	-	3	-	-	-	2	2	-	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	12	-	-
Apply	50	13	100	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S. Rangasamy College of Technology – Autonomous R2022								
Common to All Branches								
60 CS 0P1– C Programming Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

List of Experiments:

1. Implementation of Simple Computational Problems Using Various Formulas*.
2. Implementation of Problems Involving Selection Statements*.
3. Implementation of Iterative problems e.g., Sum of Series*.
4. Implementation of 1D Array manipulation*.
5. Implementation of 2D Array manipulation*.
6. Implementation of String operations*.
7. Implementation of Simple functions and Different Ways of Passing Arguments to Functions and Recursive Functions*.
8. Implementation of Pointers*.
9. Implementation of Structures and Union*.
10. Implementation of Bit Fields, Typedef and Enumeration*.
11. Implementation of Preprocessor Directives*.
12. Implementation of File Operations*.

*SDG:4- Quality Education

Course Designer(s)

1. Dr.P. Kaladevi- kaladevi@ksrct.ac.in

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K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2025 - 2026)

SECOND SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment *	End Semester Exam **	Max. Marks		
THEORY								
1.	60 EN 002	Professional English II	2	40	60	100	45	100
2.	60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	2	40	60	100	45	100
3.	60 EE 001	Basic Electrical and Electronics Engineering	2	40	60	100	45	100
4.	60 PH 004	Physics for Computer Technology	2	40	60	100	45	100
5.	60 IT 001	Python Programming	2	40	60	100	45	100
6.	60 GE 002	Tamils and Technology /தமிழரும் தொழில்நுட்பமும்	2	40	60	100	45	100
PRACTICALS								
7.	60 CP 0P2	Engineering Physics and Chemistry Laboratory	2	60	40	100	45	100
8.	60 IT 0P1	Python Programming Laboratory	2	60	40	100	45	100
9.	60 CG 0P1	Career Skill Development I	2	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination and 40 marks for practical End Semester Examination.

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60 EN 002	Professional English II	Category	L	T	P	Credit
		HS	1	0	2	2

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities.
- Develop message generating and delivery skills.

Pre-requisites

- Basic knowledge of reading and writing in English and should have completed Professional English I.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Understand
CO2	Illustrate cause and effects in events, industrial processes through technical texts	Understand
CO3	Infer problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Understand
CO4	Relate events and the processes of technical and industrial nature.	Remember
CO5	Demonstrate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO2	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
CO4	-	-	-	-	-	-	-	2	3	3	2	3	3	3	3
CO5	-	-	-	-	-	-	-	2	3	3	2	3	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	50	50	80
Apply	-	-	-
Analyse	-	-	-
Create	-	-	-
Total	60	60	100

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60 EN 002 - Professional English II

Common to All Branches

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	0	2	45	2	40	60	100

Making Comparisons* **Listening:** Evaluative Listening: Advertisements, Product Descriptions, - Audio / Video; Filling a Graphic Organiser (Choosing a Product or Service by Comparison) **Speaking:** Marketing a Product, Persuasive Speech Techniques. **Reading:** Reading Advertisements, User Manuals and Brochures. **Writing:** Professional Emails, Email Etiquette - Compare and Contrast Essay. **Language Focus:** Mixed Tenses, Prepositional Phrases, Same Words used in Different Contexts and Discourse Markers.	[9]
Expressing Causal Relations in Speaking And Writing* **Listening:** Listening to Longer Technical Talks and Completing - Gap Filling Exercises. Listening Technical Information from Podcasts – Listening to Process/Event Descriptions to Identify Cause & Effects. **Speaking:** Describing and Discussing the Reasons of Accidents or Disasters Based on News Reports. **Reading:** Longer Technical Texts - Cause and Effect Essays and Letters / Emails of Complaint. **Writing:** Writing Responses to Complaints. **Language Focus:** Active Passive Voice Transformations, Infinitive and Gerunds – Word Formation (Noun-Verb-Adj-Adv), Adverbs.	[9]
Problem Solving* **Listening:** Listening to / Watching Movie Scenes/ Documentaries Depicting a Technical Problem and Suggesting Solutions. **Speaking:** Group Discussion (Based on Case Studies), - Techniques and Strategies. **Reading:** Case Studies, Excerpts from Literary Texts, News Reports etc. **Writing:** Letter to the Editor, Checklists, Problem Solution Essay / Argumentative Essay **Language Focus:** Error Correction; If Conditional Sentences - Compound Words, Sentence Completion.	[9]
Reporting of Events and Research* **Listening:** Listening Comprehension Based on New Report and Documentaries. **Speaking:** Interviewing, Presenting Oral Reports, Mini Presentations on Select Topics. **Reading:** Newspaper Articles. **Writing:** Recommendations, Transcoding, Accident Report, Precis Writing and Summarising. **Language Focus:** Reported Speech - Modals – Conjunctions - Use of Prepositions.	[9]
The Ability to Put Ideas or Information Coherently* **Listening:** Listening to TED Talks, Presentations, Formal Job Interviews, (Analysis of the Interview Performance). **Speaking:** Participating in Role Plays, Virtual Interviews, Making Presentations with Visual Aids **Reading:** Excerpts of Interview with Professionals **Writing:** Job / Internship Application – Cover Letter & Resume **Language Focus:** Numerical Adjectives, Question Types: Wh/ Yes Or No/ and Tags; Relative Clauses - Idioms.	[9]
Total Hours:	**45**

Text Book(s):

1.	"English for Engineers & Technologists" Orient Blackswan Private Ltd. Department of English, Anna University, 2020.
2.	Norman Lewis, "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book", Penguin Random House India, 2020.

Reference(s):

1.	Raman. Meenakshi, Sharma. Sangeeta, "Professional English", Oxford University Press. New Delhi. 2019.
2.	Arthur Brookes and Peter Grundy, "Beginning to Write: Writing Activities for Elementary and Intermediate Learners", Cambridge University Press, New York, 2003.
3.	Prof. Sharma R.C. & Krishna Mohan, "Business Correspondence and Report Writing", Tata McGraw Hill & Co. Ltd., New Delhi, 2001.
4.	Arora V.N and Laxmi Chandra, "Improve Your Writing", Oxford University Press, New Delhi, 2001.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Making Comparisons**	
1.1	Evaluative Listening	1
1.2	Product Descriptions and Filling a Graphic Organiser	1
1.3	Marketing a Product by Using Persuasive Techniques	2
1.4	Reading Advertisements, User Manuals and Brochures	1
1.5	Writing Professional Emails	1
1.6	Compare and Contrast Essay	1
1.7	Mixed Tenses and Prepositional Phrases	1
1.8	Same Words Used in Different Contexts	1
2.0	**Expressing Causal Relations in Speaking and Writing**	
2.1	Listening to Longer Technical Talks	1
2.2	Listening to Process/Event Descriptions	1
2.3	Describing and Discussing the Reasons of Accidents or Disasters	1
2.4	Reading Longer Technical Texts– Cause and Effect Essays	1
2.5	Writing Responses to Complaints	1
2.6	Active Passive Voice Transformations	2
2.7	Infinitive and Gerunds	1
2.8	Word Formation (Noun-Verb-Adj-Adv), Adverbs.	1
3.0	**Problem Solving**	
3.1	Listening to Documentaries and Suggesting Solutions	1
3.2	Group Discussion (Based on Case Studies)	2
3.3	Reading Case Studies, Excerpts from Literary Texts and News Reports	1
3.4	Letter to the Editor	1
3.5	Checklists	1
3.6	Problem Solution and Argumentative Essays	1
3.7	Error Correction and Sentence Completion	1
3.8	If Conditional Sentences	1
4.0	**Reporting of Events and Research**	
4.1	Listening Comprehension	1
4.2	Interviewing and Presenting oral Reports	1
4.3	Mini Presentations on Select Topics	1
4.4	Reading Newspaper Articles	1
4.5	Recommendations	1
4.6	Transcoding	1
4.7	Precis Writing and Summarising	1
4.8	Reported Speech, Modals	1
4.9	Conjunctions	1

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5.0	**The Ability to Put Ideas or Information Coherently**	
5.1	Listening to Formal Job Interviews	1
5.2	Role Plays	2
5.3	Virtual Interviews	1
5.4	Reading Company Profiles	1
5.5	Writing Statement of Purpose (Sops)	1
5.6	Writing Résumé	1
5.7	Numerical Adjectives and Relative Clauses - Idioms	1
5.8	Question Types: Wh/ Yes Or No/ and Tags	1
	Total Hours	**45**

Course Designer(S)

1.Dr.A.Palaniappan- palaniappan@ksrct.ac.in

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60 MA 003	Integrals, Partial Differential Equations and Laplace Transform	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To acquire the knowledge about multiple integrals.
- To familiarize the basic concepts of vector calculus.
- To get exposed to the fundamentals of analytic functions.
- To solve various types of partial differential equations.
- To familiarize the concepts of Laplace transform.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Interpret the basic concepts of double and triple integrals.	Apply
CO2	Interpret the basic concepts of vector calculus.	Apply
CO3	Construct the analytic functions and evaluate complex integrals.	Apply
CO4	Compute the solution of partial differential equations using different methods.	Apply
CO5	Apply Laplace transform techniques for solving differential equations.	Apply

Mapping with Programme Outcomes

COs	POs											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	30
Apply	40	40	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	**60**	**60**	**100**

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 MA 003 - Integrals, Partial Differential Equations and Laplace Transform								
Common to MECH, ECE, EEE, CSE, MCT, CIVIL, IT, TXT, BT, FT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

Multiple Integrals Double Integration - Cartesian and Polar Coordinates - Change of Order of Integration - Area as Double Integral - Triple Integration in Cartesian Coordinates - Change of Variables - Cartesian to Polar Coordinates and Cartesian to Cylindr ical Coordinates. **Hands-On:** Evaluating Double Integrals, Triple Integrals, Area as Double Integrals, and Volume as Triple Integrals.	[9]
Vector Calculus* Introduction - Gradient of a Scalar Point Function – Directional Derivative – Angle of Intersection of Two Surfaces – Divergence and Curl (excluding Vector Identities) – Solenoidal and Irrotational Vectors – Application: Green's Theorem in the Plane – Gauss Divergence Theorem - Stokes' Theorem (Statement only). **Hands-On:** Evaluating Gradient, Divergence, and Curls.	[9]
Analytic Functions and Integrals Analytic Function – Necessary and Sufficient Conditions (Statement only) - Properties – Harmonic Function – Construction of an Analytic Function – Cauchy's Integral Theorem (Statement only) – Cauchy's Integral Formula – Classification of Singularities – Application: Cauchy's Residue Theorem. **Hands-On:** Plotting and Visualizing Functions of Single Variable, Two and Three Variables.	[9]
Partial Differential Equations* Formation of Partial Differential Equations by Eliminating Arbitrary Constants and Arbitrary Functions – Non-Linear Partial Differential Equations of First Order – Lagrange's Linear Equations – Application: Homogeneous Linear Partial Differential Equations with Constant Coefficients. **Hands - on:** Calculate Homogeneous Linear Partial Differential Equations.	[9]
Laplace Transform Conditions for Existence – Transforms of Elementary Functions – Basic Properties - Derivatives and Integrals of Transforms - Initial and Final Value Theorem – Transform of Periodic Functions. Inverse Laplace Transform – Convolution Theorem (Excluding Proof) – Application: Solution of Second Order Ordinary Differential Equations with Constant Coefficients. **Hands - on:** Evaluating laplace, Inverse laplace transforms and solve differential equations.	[9]
Total Hours: 45 + 5(Hands on) + 10(Tutorial)	**60**

Text Book(s):	
1.	Grewal B.S, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2017.
2.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10thEdition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.
Reference(s):	
1.	Dass H.K, "Higher Engineering Mathematics", 3rd (Revised) Edition, S.Chand& Company Ltd, New Delhi, 2014.
	Veerarajan T, "Engineering Mathematics", for Semesters I & II, 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.
2.	Kandasamy P, Thilagavathy K and Gunavathy K, "Engineering Mathematics - I", S.Chand& Company Ltd, New Delhi, 2017
3.	Bali N P and Manish Goyal, "A Text Book of Engineering Mathematics", 10thEdition, Laxmi Publications (P) Ltd, 2016.

*SDG 4 – Quality in Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Multiple Integrals**	
1.1	Double Integration	1
1.2	Cartesian and Polar Coordinates	1
1.3	Change of Order of Integration	1
1.4	Area as Double Integral	1
1.5	Triple Integration in Cartesian Coordinates	1
1.6	Change of Variables	2
1.7	Cartesian to Polar Coordinates	1
1.8	Cartesian to Cylindrical Coordinates	1
1.9	Tutorial	2
1.10	Hands on	1
2.0	**Vector Calculus**	
2.1	Introduction: Gradient of a Scalar Point Function	1
2.2	Directional Derivative	1
2.3	Angle of Intersection of Two Surfaces	1
2.4	Divergence and Curl (Excluding Vector Identities)	1
2.5	Solenoidal and Irrotational Vectors	1
2.6	Application: Green's Theorem in the Plane	1
2.7	Gauss Divergence Theorem	2
2.8	Stokes' Theorem (Statement only)	1
2.9	Tutorial	2
2.10	Hands on	1
3.0	**Analytic Functions and Integrals**	
3.1	Analytic Function	1
3.2	Necessary and Sufficient Conditions (Statement only)	1
3.3	Properties	1
3.4	Harmonic Function	1
3.5	Construction of an Analytic Function	1
3.6	Cauchy's Integral Theorem (Statement only), Cauchy's Integral Formula	2
3.7	Classification of Singularities	1
3.8	Applications: Cauchy's Residue Theorem.	1
3.9	Tutorial	2
3.10	Hands on	1
4.0	**Partial Differential Equations**	
4.1	Formation of Partial Differential Equations by Eliminating Arbitrary Constants	1
4.2	Formation of Partial Differential Equations by Eliminating Arbitrary Functions	2
4.3	Non-linear Partial Differential Equations of First Order	3
4.4	Lagrange's Linear Equations	1
4.5	Application: Homogeneous Linear Partial Differential Equations with Constant Coefficients.	2
4.6	Tutorial	2
4.7	Hands on	1
5.0	**Laplace Transform**	
5.1	Conditions for Existence	1

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5.2	Transforms of Elementary Functions	1
5.3	Basic Properties	1
5.4	Derivatives and Integrals of Transforms, Initial and Final Value Theorem	1
5.5	Transform of Periodic Functions	1
5.6	Inverse Laplace Transform	1
5.7	Convolution Theorem (Excluding Proof)	1
5.8	Application: Solution of Second Order Ordinary Differential Equation with Constant Coefficient.	2
5.9	Tutorial	2
5.10	Hands on	1
	Total	**60**

Course Designer(s)
1.Dr. C.Chandran – cchandran@ksrct.ac.in
2.Dr K. Prabakaran – prabakaran@ksrct.ac.in

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60 EE 001	Basic Electrical and Electronics Engineering	Category	L	T	P	Credit
		ES	3	0	0	3

Objectives

- To familiarize the basic concept electrical circuits and its various parameters
- To facilitate the various types of electrical machines and their uses
- To gain knowledge on Electrical safety
- To provide exposure on the functions of various semiconductor devices
- To familiarize the use of various measuring instruments

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the basic laws of electric circuits to calculate the unknown quantities.	Apply
CO2	Acquire knowledge on different electrical machines and select suitable machines for industrial applications.	Apply
CO3	Express the significance of various components of low voltage electrical installations and create awareness on electrical safety.	Understand
CO4	Demonstrate the operation and characteristics of various semiconductor devices.	Understand
CO5	Interpret the operating principles of measuring instruments and choose suitable instrument for measuring the parameters.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	2	-	-	-	-	2	-	-	-
CO3	3	3	-	-	-	2	-	-	-	-	-	2	-	-	-
CO4	2	2	-	-	-	-	2	-	-	2	-	2	2	2	2
CO5	2	3	-	-	-	-	3	-	3	2	-	2	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	20
Understand	20	40	40
Apply	20	-	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech– Information Technology								
60 EE 001 - Basic Electrical and Electronics Engineering								
Common to CSE, IT, AI&DS, AIML, MECH, MCT, BT, FT and CIVIL								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Electrical Circuits DC Circuits: Circuit Components: Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws– Simple problems. Introduction to AC Circuits and Parameters: Waveforms, Average Value and RMS Value of Sinusoidal Waveform Real Power, Reactive Power and Apparent Power, Power Factor – Steady State Analysis of RLC Series Circuits- Simple Problems. Introduction to Three Phase AC Circuits.	[9]
Electrical Machines* Construction and Working Principle - Separately and Self Excited DC Generators, EMF Equation, Types and Applications. Working Principle of DC Motors, Torque Equation, Types and Applications. Construction, Working Principle and Applications of Transformer, Three Phases Alternator, Synchronous Motor and Three Phase Induction Motor.	[9]
Electrical Installations* Domestic Wiring, Types of Wires and Cables, Earthing, Protective Devices- Switch Fuse Unit- Miniature Circuit Breaker-Moulded Case Circuit Breaker- Earth Leakage Circuit Breaker, Batteries and Types, UPS, Safety Precautions and First Aid.	[9]
Analog Electronics* Introduction to Semiconductor Materials– PN Junction Diodes, Zener Diode –Characteristics and Applications – Bipolar Junction Transistor-Biasing and Configuration (NPN) - Regulated Power Supply Unit, Switched Mode Power Supply.	[9]
Measurements and Instrumentations* Functional Elements of an Instrument, Standards and Calibration, Operating Principle, Types - Moving Coil and Moving Iron Meters, Operating Principles and Types of Wattmeter, Energy Meter, Instrument Transformers-CT and PT, DSO- Block Diagram- Data Acquisition.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Kothari DP and Nagrath I.J, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2.	Sawhney A.K., Puneet Sawhney, "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2015.
Reference(s):	
1.	Kothari DP and Nagrath I.J, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2.	Albert Malvino, David Bates, "Electronic Principles", McGraw Hill Education; 7th edition, 2017.
3.	Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
4.	Kalsi H.S., "Electronic Instrumentation", Tata McGraw-Hill, New Delhi, 2010.

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S.No.	Topics	No. of hours
1.0	**Electrical Circuits**	
1.1	Ohm's Law - Kirchhoff's Laws	1
1.2	Ohm's Law - Kirchhoff's Laws - Problems	1
1.3	Introduction to AC Circuits and Parameters: Waveforms, Average Value and RMS Value of Sinusoidal Waveform	1
1.4	Real Power, Reactive Power and Apparent Power, Power Factor	2
1.5	Steady State Analysis of RLC Series Circuits	1
1.6	RLC Series Circuits - Problems	1
1.7	Introduction to Three Phase System	1
1.8	Ohm's Law - Kirchhoff's Laws	1
2.0	**Electrical Machines**	
2.1	Construction and Working Principle of DC Generator	1
2.2	Types and Applications of Separately and Self Excited DC Generators	1
2.3	EMF Equation of DC Generator	1
2.4	Working Principle of DC Motors	1
2.5	Torque Equation,Types and Applications	1
2.6	Construction, Working Principle and Applications of Transformer	1
2.7	Construction, Working Principle and Applications of Three Phase Alternator	1
2.8	Construction, Working Principle and Applications of Synchronous Motor	1
2.9	Construction, Working Principle and Applications of Three Phase Induction Motor	1
3.0	**Electrical Installations**	
3.1	Domestic Wiring, Types of Wires and Cables	1
3.2	Earthing, Protective Devices	2
3.3	Switch Fuse Unit - Miniature Circuit Breaker	1
3.4	Molded Case Circuit Breaker - Earth Leakage Circuit Breaker	1
3.5	Batteries and Types	2
3.6	UPS	1
3.7	Safety Precautions and First Aid	1
4.0	**Analog Electronics**	
4.1	Introduction to Semiconductor Materials	1
4.2	Characteristics and Applications of PN Junction Diodes	2
4.3	Characteristics and Applications of Zener Diode	1
4.4	Bipolar Junction Transistor	1
4.5	Biasing & Configuration (NPN)	2
4.6	Regulated Power Supply Unit	1
4.7	Switched Mode Power Supply	1
5.0	**Measurements and Instrumentation**	

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5.1	Functional Elements of an Instrument	1
5.2	Standards and Calibration	1
5.3	Moving Coil Meters - Operating Principle, Types	1
5.4	Moving Iron Meters - Operating Principle, Types	1
5.5	Operating Principles and Types of Wattmeter	1
5.6	Energy Meter	1
5.7	Instrument Transformers – CT & PT	1
5.8	DSO- Block Diagram- Data Acquisition	2

Course Designer(s)

1. Mr.S.Srinivasan - srinivasan@ksrct.ac.in
2. Ms.R.Radhamani -radhamani@ksrct.ac.in
3. Ms.S.Jaividhya- jaividhya@ksrct.ac.in
4. Dr.S.Gomathi- gomathi@ksrct.ac.in
5. Mr.T.Prabhu- prabhut@ksrct.ac.in

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60 PH 004	Physics for Computer Technology (B.E/B.Tech. CSE, IT, AI&DS & AI&ML)	Category	L	T	P	Credit
		BS	3	0	0	3

Objectives

- To instil knowledge on physics of semiconductors, determination of charge carriers and device applications
- To enable the students to correlate the theoretical principles with application-oriented studies in optoelectronic materials
- To introduce the basics of laser, optical fiber and its applications in information science
- To understand the basic concepts of magnetic materials and its applications
- To inculcate an idea of significance of nano structures, ensuing nano device applications and quantum computing

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Acquire knowledge on basics of semiconductor physics and its applications in various devices	Apply
CO2	Apply the principles of LCD, photo detectors and optoelectronic devices for various engineering applications	Understand
CO3	Realize a strong foundational knowledge in lasers and fiber optics.	Understand
CO4	Impart knowledge on magnetic properties of materials and their applications in data storage.	Understand
CO5	Recognize the basics of quantum structures and their applications and basics of quantum computing	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO2	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO3	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO4	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
CO5	3	-	-	-	-	-	-	2	-	2	-	-	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remembe	10	14	16
Understand	46	46	80
Apply	04	-	04
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 PH 004 - Physics for Computer Technology								
Common to All Branches								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Semiconducting Materials* Intrinsic Semiconductors - Energy Band Diagram - Direct and Indirect Band Gap Semiconductors - Carrier Concentration in Intrinsic Semiconductors - Extrinsic Semiconductors - Carrier Concentration in N-type & P-type Semiconductors – Carrier Transport in Semiconductor: Random Motion, Drift, Mobility and Diffusion – Hall Effect and Devices – Ohmic Contacts – Schottky Diode.	[9]
Optoelectronic Materials and Devices* Photoconductive Materials – Light Dependent Resistor – Working of LDR – Applications of LDR – Photovoltaic Materials – Solar Cell – Construction and Working of a Solar Cell – Applications of Solar Cells – Liquid Crystals – Liquid Crystal Display (LCD) – Construction and Advantages of LCD – Electro Optic Materials – Optoelectric Effect - Electro-Optic Modulation.	[9]
Photonics* Theory of Laser - Characteristics - Einstein's Coefficients - Population Inversion - Nd-YAG Laser, Semiconductor Laser - Applications of Lasers: Micro Machining, Measurement of Long Distances, IR Thermography, CD Write Devices and Printers - Optical Fibre- Principle - Types - Material, Mode, Refractive Index - Fibre Loss - Expression for Acceptance Angle and Numerical Aperture. Application – Fiber Optic Communication.	[9]
Magnetic Materials and Devices* Origin of Magnetic Moment - Bohr Magneton - Classification of Magnetic Materials - Diamagnetism - Paramagnetism - Ferromagnetism - Anti Ferromagnetism - Ferri Magnetism - Domain Theory - Hysteresis - Soft and Hard Magnetic Materials - Examples and Uses - Magnetic Principle in Computer Data Storage - Magnetic Hard Disc (Giant Magneto Resistance Sensor).	[9]
Nanotechnology and Quantum Computing* Introduction - Preparation of Nano Materials: Top-down Process: Ball Milling Method - Bottom-up Process: Vapour Phase Deposition Method. Carbon Nano Tubes - Structures, Properties and Preparation by Electric Arc Method. MEMS/NEMS Devices and Applications- Quantum System for Information Processing - Quantum States - Classical Bits - Quantum Bits - Multiple Qubits - Quantum Gates.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Avadhanulu M. N., Kshirsagar P. G., Arun Murthy TVS "A Text Book of Engineering Physics", S Chand Publications, New Delhi, 2022.
2.	Malik H. K, Singh A. K, "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. 2021
3.	Joshi D. R. , "Engineering Physics" McGraw Hill Education Private Limited, New Delhi. 2010
Reference(s):	
1.	Pillai S.O. , "A Textbook Of Engineering Physics" New Age International (P) Limited, New Delhi, 2014
2.	Laud B. B ," Lasers and Non-Linear Optics" New Age International Publications, New Delhi, 2015
3.	Palanisamy P.K., "Physics of Materials", Scitech Publications, Chennai. 2012

*SDG 4 – Quality in Education

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Semiconducting Materials**	
1.1	Intrinsic Semiconductors	1
1.2	Energy Band Diagram - Direct and Indirect Band Gap Semiconductors	1
1.3	Carrier Concentration in Intrinsic Semiconductors	1
1.4	Extrinsic Semiconductors	1
1.5	Carrier Concentration in N-type & P-type Semiconductors	1
1.6	Carrier Transport in Semiconductor: Random Motion	1
1.7	Carrier Transport in Semiconductor Drift, Mobility and Diffusion	1
1.8	Hall Effect and Devices	1
1.9	Ohmic Contacts – Schottky Diode	1
2.0	**Optoelectronic Materials and Devices**	
2.1	Photoconductive Materials.	1
2.2	Light Dependent Resistor – Working of LDR – Applications of LDR	1
2.3	Photovoltaic Materials	1
2.4	Solar Cell – Construction and Working of a Solar Cell	1
2.5	Applications of Solar Cells	1
2.6	Liquid Crystals – Liquid Crystal Display (LCD)	1
2.7	Construction and Advantages of LCD	1
2.8	Electro Optic Materials – Optoelectric Effect	1
2.9	Electro-Optic Modulation	1
3.0	**Photonics**	
3.1	Theory of Laser - Characteristics	1
3.2	Einstein's Coefficients - Population Inversion	1
3.3	Nd-YAG Laser, Semiconductor Laser	1
3.4	Applications of Lasers: Micro Machining, Measurement of Long Distances	1
3.5	Applications of Lasers IR Thermography, CD Write Devices and Printers	1
3.6	Optical Fibre- Principle	1
3.7	Types - Material, Mode, Refractive Index - Fibre Loss	1
3.8	Expression for Acceptance Angle and Numerical Aperture	1
3.9	Application – Fiber Optic Communication	1
4.0	**Magnetic Materials and Devices**	
4.1	Origin of Magnetic Moment	1
4.2	Bohr Magnet on - Classification of Magnetic Materials	1
4.3	Diamagnetism - Paramagnetism -	1
4.4	Ferromagnetism - Anti Ferromagnetism	1
4.5	Ferri Magnetism - Domain Theory	1
4.6	Domain Theory - Hysteresis	1
4.7	Soft and Hard Magnetic Materials - Examples and Uses	1
4.8	Magnetic Principle in Computer Data Storage	1
4.9	Magnetic Hard Disc (Giant Magneto Resistance Sensor)	1
5.0	**Nano Technology and Quantum Computing**	
5.1	Introduction	1
5.2	Preparation of Nano Materials	1
5.3	Top-down Process: Ball Milling Method	1
5.4	Bottom-up Process: Vapour Phase Deposition Method	1

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5.5	Carbon Nano Tubes - Structures, Properties	1
5.6	Preparation by Electric Arc Method	1
5.7	MEMS/NEMS Devices and Applications	1
5.8	Quantum System for Information Processing	1
5.9	Quantum States - Classical Bits - Quantum Bits - Multiple Qubits - Quantum Gates	1
	Total Hours	**45**

Course Designer(s)

1. Dr. V. Vasudevan: vasudevanv@ksrct.ac.in
2. Mr.S. Vanchinathan: vanchinathan@ksrct.ac.in
3. Dr.P. Suthanthira Kumar: suthanthirakumar@ksrct.ac.in

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60 IT 001	Python Programming	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To know the basics of programming in python
- To understand modules and functions
- To study files and exception handling
- To recognize the basics concepts of NumPy
- To create layouts using graphical tools

Pre-requisites

- Basic knowledge of mathematics and programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the basics of Python programming for problem-solving	Apply
CO2	Develop programs using modules and functions	Apply
CO3	Implement programs using file and exception handling	Apply
CO4	Createa solution for real world problems using NumPy arrays	Apply
CO5	Design layouts with GUI toolkits using Tkinter	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	30	30
Apply	30	30	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech - Information Technology								
60 IT 001 - Python Programming								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

Introduction Introduction to Python – Strings – List – Tuples - Dictionaries – Basic Operators – Decision Making – Loops	[9]
Modular Design Modules – Python Module – Namespaces – Importing Modules – Loading and Execution – Program Routine – Functions – Parameter Passing - Types – Recursion	[9]
Files and Exception Handling* Introduction - Data Streams - Creating Own Data Streams - Access Modes - Writing Data to a File – Reading Data From a File - Additional File Methods- Exceptions – Types, Handling Exceptions, User Defined Exceptions	[9]
NumPy Basics NumPy Data Types – NumPy Arrays - Creating, Adding Items, Removing Items, Printing Items, Sorting Items, Reshaping, Indexing and Slicing	[9]
GUI Programming and Graphics** GUI Programming Toolkits – Introduction to Tkinter – Creating GUI Widgets – Resizing – Configuring Widget Options – Creating Layouts – Radio Buttons – Check Boxes – Dialog Boxes – Drawing Using Turtle	[9]
Total Hours: 45+15	**60**

Text Book(s):	
1.	John Paul Mueller, “Beginning Programming with Python”, 2nd Edition, Wiley India Pvt Ltd, 2014
2.	Usman Malik, “Python NumPy for Beginners : NumPy Specialization for data Scientists”, AI Publishing, 2021
Reference(s):	
1.	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education, 2013
2.	Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.
3.	Charles Dierbach, “Introduction to Computer Science using Python”, 2nd Edition, Wiley India Pvt Ltd, 2015
4.	Dr.Nageswara Rao R. “Core Python Programming”, DreamTech Press, 2nd Edition, 2018

****** SDG-4 – Quality Education

***** SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction**	
1.1	Introduction to Python	1
1.2	Basic Data Types	1
1.3	Strings	1
1.4	List	1
1.5	Tuples	1
1.6	Dictionaries	1
1.7	Basic Operators	1
1.8	Decision Making Statements	1
1.9	Looping Statements	1
2.0	**Modular Design**	
2.1	Modules	1
2.2	Python module	1
2.3	Namespaces	1
2.4	Importing Modules	1
2.5	Loading and Execution	1
2.6	Program Routine	1
2.7	Functions	1
2.8	Parameter Passing Types	1
2.9	Recursion	1
3.0	**Files and Exception Handling**	
3.1	Introduction	1
3.2	Data Streams	1
3.3	Creating Own Data Streams	1
3.4	Access Modes	1
3.5	Writing Data to a File, Reading Data from a File	1
3.6	Additional File Methods	1
3.7	Exceptions and Types	1
3.8	Handling Exceptions	1
3.9	User Defined Exceptions	1
4.0	**NumPy Basics**	
4.1	NumPy Data Types	1
4.2	NumPy Arrays	1
4.3	Creating Arrays	1
4.4	Adding Items into Arrays	1
4.5	Removing Items	1
4.6	Printing Items	1
4.7	Sorting Items	1
4.8	Reshaping	1
4.9	Indexing and Slicing	
5.0	**GUI Programming and Graphics**	
5.1	GUI Programming Toolkits	1
5.2	Introduction to Tkinter	1
5.3	Creating GUI widgets	1
5.4	Resizing	1

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5.5	Configuring Widget options	1
5.6	Creating Layouts	1
5.7	Radio buttons & Check boxes	1
5.8	Dialog boxes	1
5.9	Drawing using Turtle	1
	Total Hours	**45**

Course Designer(s)

1. Dr. C.Nallusamy - nallusamyc@ksrct.ac.in

2. Mr.R.T.Dineshkumar – dineshkumarrt@ksrct.ac.in

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60 GE 002	Tamils and Technology (Common to all Branches)	Category	L	T	P	Credit
		GE	1	0	0	1*

Objectives:

- To learn weaving, ceramic and construction technology of Tamils.
- To understand the agriculture, irrigation and manufacturing technology of Tamils.
- To realize the development of scientific Tamil and Tamil computing.

Prerequisite:

Nil

Course Outcomes:

On the successful completion of the course, students will be able to

CO1	Understand the weaving and ceramic technology of ancient Tamil people nature.	Understand
CO2	Comprehend the construction technology, building materials in sangam period and case studies.	Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.	Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.	Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	3	-	2	-	3
CO2	-	-	-	-	-	-	3	3	-	2	-	3
CO3	-	-	-	-	-	-	3	3	-	2	-	3
CO4	-	-	-	-	-	-	3	3	-	2	-	3
CO5	-	-	-	-	-	-	3	3	-	2	-	3

3- Strong; 2-Medium; 1-Low

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	End Sem Examination (Marks)
	1	
Remember	50	40
Understand	50	-
Apply	-	60
Analyse	-	-
Evaluate	-	-
Create	-	-
Total	100	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
60 GE 002 – Tamils and Technology								
Common to all branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1*	40	60	100

Weaving and Ceramic Technology Weaving Industry During Sangam Age – Ceramic Technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.	[3]
Design and Construction Technology Designing and Structural Construction House & Designs in Household Materials during Sangam Age – Building Materials and Hero Stones of Sangam Age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other Worship Places – Temples of Nayaka Period - Type Study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal – Chetti Nadu Houses , Indo – Saracenic Architecture at Madras during British Period.	[3]
Manufacturing Technology Art of Ship Building – Metallurgical Studies – Iron Industry – Iron Smelting, Steel -Copper and Gold Coins as Source of History – Minting of Coins – Beads Making – Industries Stone Beads – Glass Beads – Terracotta Beads – Shell Beads/Bone Beats – Archeological Evidences -Gem Stone Types described in Silappathikaram.	[3]
Agriculture and Irrigation Technology Dam,Tank,Ponds,Sluice,Significance of Kumizhi Thoompu of Chola Period,Animal Husbandry – Wells Designed for Cattle use – Agriculture and Agro Processing – Knowledge of Sea- Fisheries – Pearl – Conche Diving -Ancient Knowledge of Ocean – Knowledge Specific Society.	[3]
Scientific Tamil & Tamil Computing Development of Scientific Tamil – Tamil Computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy- Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	[3]
Total Hours:	15

Text Book(s):

1.	*தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).*
2.	*கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).*
3.	*கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு).*
4.	*பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு).*
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

*SDG 9 – Industry Innovation and Infrastructure
**SDG 4: Quality Education

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60 GE 002	தமிழரும் தொழில்நுட்பமும் (அனைத்து துறைகளுக்கும் பொதுவானது)	Category	L	T	P	Credit
		GE	1	0	0	1*

பாடத்தின் நோக்கங்கள்:

- தமிழர்களின் சங்ககால நெசவு, பனை வனைதல் மற்றும் கட்டிட தொழில் நுட்பம் குறித்து அறிதல்.
- தமிழர்களின் சங்ககால வேளாண்மை, நீர்ப்பாசனம் மற்றும் உற்பத்தி முறைகள் குறித்த கற்றல்.
- நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிதல்.

முன்கூட்டிய துறைசார் அறிவு:

தேவை இல்லை

பாடம் கற்றதின் விளைவுகள்:

பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானை வனைதல் தொழில்நுட்பம் குறித்த கற்றுணர்தல்	புரிதல்
CO2	சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமானப் பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்த அறிவு.	புரிதல்
CO3	சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு.	புரிதல்
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.	புரிதல்
CO5	நவீன அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்துதலும்.	பகுப்பாய்வு

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)	End Sem Examination (Marks)
	1	
Remember	50	40
Understand	50	-
Apply	-	60
Analyse	-	-
Evaluate	-	-
Create	-	-
Total	100	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
60 GE 002 – தமிழரும் தொழில்நுட்பமும்								
Common to all branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	1	0	0	15	1*	40	60	100

நெசவு மற்றும் பானைத் தொழில்நுட்பம்: *சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.*	[3]
வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: *சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கல் - நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை.*	[3]
உற்பத்தித் தொழில் நுட்பம்: *கப்பல் கட்டும் கலை – உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள் , கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.*	[3]
வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம்: *அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்கான வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.*	[3]
அறிவியல் தமிழ் மற்றும் கணித்தமிழ் *அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.*	[3]
Total Hours:	15

Text Book(s):

1.	*தமிழக வரலாறு - மக்களும் பண்பாடும் கே. கே . பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).*
2.	*கணினித்தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).*
3.	*கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரீகம் (தொல்லியல் துறை வெளியீடு).*
4.	*பொருநை - ஆற்றங்கரை நாகரீகம் (தொல்லியல் துறை வெளியீடு).*
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print).
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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60 CP 0P2	Engineering Physics and Chemistry Laboratory (CSE,IT,EEE,ECE)	Category	L	T	P	Credit
		BS	0	0	4	2

Objectives

- To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To demonstrate an ability to make physical measurements and understand the limits of precision in measurements
- To Analyse the behavior and characteristics of various materials for its optimum utilization
- Test the knowledge of theoretical concepts and develop the experimental skills of the learners.
- To facilitate data interpretation and expose the learners to various industrial and environmental applications

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyse the properties of semiconducting materials for its potential applications	Analyse
CO2	Realize the interference and diffraction phenomena by Air wedge and laser xperiments	Apply
CO3	Recognize the magnetic properties by experimental verification	Apply
CO4	Apply different techniques of qualitative and quantitative chemical analysis to generate experimental skills and apply these skills to various analyses	Apply
CO5	Explain and Analyse instrumental techniques for chemical analysis	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	2	2	-	-	-	-	-	2
CO5	3	-	-	-	-	-	-	2	2	-	-	-	-	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	10	-	10	10
Understand	30	30	30	30
Apply	40	40	40	40
Analyse	20	30	20	20
Evaluate	-	-	-	-
Create	-	-	-	-
Total	100	100	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 CP 0P2- Engineering Physics and Chemistry Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100

List of Experiments: (Physics)

1. Determination of Hall coefficient of a given semiconductor and its charge carrier density
2. V-I Characteristics of Zener diode and Solar cell
3. Air wedge - Determination of thickness of a thin sheet/wire
4. a) Laser- Determination of the wave length of the laser using grating
   b) Optical fibre -Determination of numerical aperture and acceptance angle
5. Magnetic field along the axis of current carrying coil – Stewart and Gee

List of Experiments (Chemistry):

1. Estimation of HCl by pH meter.
2. Estimation of mixture of acids by conductivity meter
3. Determination of ferrous ion by Potentiometric titration.
4. Determination of corrosion by weight loss method.
5. Estimation of ferrous ion by spectrophotometer.

Case studies/Activity report

Lab Manual	
1.	"Engineering Physics Lab Manual", Department of Physics, KSRCT.
2.	"Chemistry Lab Manual Volume I & II", Department of Chemistry, KSRCT.

*SDG 4 – Quality Education

* SDG 6: Improve Clean Water and Sanitation

* SDG 8: Decent Work and Economic Growth

* SDG 9: Industry, Innovation, and Infrastructure

Course Designer(s)

1. Dr. V. Vasudevan - vasudevanv@ksrct.ac.in
2. Mr. S. Vanchinathan - vanchinathan@ksrct.ac.in
3. Dr. P. Suthanthira Kumar - suthanthirakumar@ksrct.ac.in
4. Dr.T.A.Sukantha – sukantha@ksrct.ac.in
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60 IT 0P1	Python Programming Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To gain basic knowledge in Python programming Language
- To understand the concept of decision making and looping statements
- To implement the function with the aid of modules using exception handling
- To implement the concepts of Numpy Arrays
- To create layouts using graphical modules such as Tkinter and Turtle

Pre-requisites

Basic knowledge of mathematics and programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement the basics and data structures of Python programming	Apply
CO2	Implement the concepts of decision-making and looping statements	Apply
CO3	Develop programs using functions and modules with exception handling	Apply
CO4	Create programs using NumPy arrays	Apply
CO5	Design layouts with GUI toolkits using Tkinter	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	50	25	100	100
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT 0P1–Python Programming Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100

List of Experiments:

1. Implement the Basic Concepts of Python
2. Implement List, Tuples, Dictionary, and String
3. Implement the Concept of Decision-Making and Looping Statements
4. Working with Functions and Modules
5. Implement File Operations
6. Build a Program with Exception Handling*
7. Perform Various NumPy Operations and Special Functions
8. Design Windows Using Tkinter
9. Draw Shapes and Images Using Turtle
10. Mini Project

*SDG 4 – Quality Education

Course Designer(s)

1. Dr.C,Nallusamy (nallusamyc@ksrct.ac.in)
2. Mr.R.T.Dineshkumar(dineshkumarrt@ksrct.ac.in)

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60 CG 0P1	Career Skill Development I	Category	L	T	P	Credit
		CG	0	0	2	1*

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adapted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Pre-requisites

Basic knowledge of reading and writing in English

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyse
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Appraise the verbal ability skills in the career development and professional contexts	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	-	-	2
CO2	-	-	-	-	-	-	-	2	3	3	2	3	-	2	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	2	-	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	-	-	-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	2	2	2
3 - Strong; 2 - Medium; 1 - Some															

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 CG 0P1 - Career Skill Development I								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	**0**	**0**	**2**	**30**	**1***	**100**	**-**	**100**

Listening* Listening for General Information-Specific Details - Audio / Video (Formal & Informal) - Listen to Podcasts / TED Talks / Anecdotes / Stories / Event Narration / Documentaries and Interviews with Celebrities - Listen to a Product and Process Descriptions, Advertisements about Products or Services.	[6]
Speaking* Self-Introduction; Introducing a Friend; Conversation - Politeness Strategies - Narrating Personal Experiences / Events; Interviewing a Celebrity; Reporting / and Summarizing of Documentaries / Podcasts / Interviews - Picture Description; Giving Instruction to use the Product; Presenting a Product - Small Talk; Mini Presentations - Group Discussions, Debates & Role Plays.	[6]
Reading* Loud Reading vs Silent Reading, Skimming & Scanning of Passages, Reading Brochures (Technical Context), Social Media Messages Relevant to Technical Contexts and Emails - Biographies, Travelogues, Newspaper Reports and Travel & Technical Blogs - Advertisements, Gadget Reviews and User Manuals - Newspaper Articles and Journal Reports - Editorials; and Opinion Blogs.	[6]
Writing* Writing Letters - Informal and Formal – Basics and Format Orientation - Paragraph Texting, Short Report on an Event (Field Trip etc.) - Definitions; Instructions; and Product / Process Description - Note-Making / Note-Taking; Recommendations; Transferring Information from Non-Verbal (Charts, Graphs to Verbal Mode) - Essay Texting.	[6]
Verbal Ability I* Reading Comprehension (MCQs) – Cloze Test - Sequencing of Sentences - Summarizing and Paraphrase - Error Detection - Spelling Test - Sentence Improvement - Preposition.	[6]
Total Hours:	**30**

Reference(s):

1.	"English for Engineers & Technologists" Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book", Penguin Random House India, 2020
3.	Michael McCarthy and Felicity O Dell, "English Vocabulary in Use: Upper Intermediate", Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, "A Course Book on Technical English" Scitech Publications (India) Pvt. Ltd. 2020

*SDG 4 – Quality in Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Listening**	
1.1	Listening for General Information and Specific Details	1
1.2	Listening to Podcasts, Documentaries, and Interviews with Celebrities	1
1.3	Narrating Personal Experiences	1
1.4	Listening to a Product and Process Descriptions	1
1.5	Listening for General Information and Specific Details	1
2.0	**Speaking**	
2.1	Self-Introduction	1
2.2	Summarizing Documentaries & Picture Narration	1
2.3	Small Talk; Mini Presentations	1
2.4	Group Discussions, Debates & Role Plays	1
2.5	Group discussions	1
3.0	**Reading**	
3.1	Loud Reading vs Silent Reading, Skimming & Scanning of Passages	1
3.2	Reading Social Media Messages Relevant to Technical Contexts and Emails	1
3.3	Reading Newspaper Reports and Travel & Technical Blogs	1
3.4	Reading Advertisements, Gadget Reviews, and User Manuals	1
3.5	Reading Newspaper Articles and Journal Reports	1
4.0	**Writing**	
4.1	Writing Letters – Informal and Formal	1
4.2	Paragraph Texting	1
4.3	Definitions and Instructions	1
4.4	Note-Making / Note-Taking	1
4.5	Essay Texting	1
5.0	**Verbal Ability**	
5.1	Reading Comprehension (MCQs) and Cloze Test	1
5.2	Sequencing of Sentences	1
5.3	Paraphrasing and Summarizing	1
5.4	Error Detection and Spelling Test	1
5.5	Prepositions	1

Course Designer(s)

1. Dr.A. Palaniappan - palaniappan@ksrct.ac.in

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2025 - 2026)

THIRD SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment*	End Semester Exam **	Max. Marks		
THEORY								
1.	60 MA 010	Mathematical Statistics and Numerical Methods	2	40	60	100	45	100
2.	60 CS 003	Data Structures	2	40	60	100	45	100
3.	60 CS 004	Java Programming	2	40	60	100	45	100
4.	60 IT 301	Software Engineering	2	40	60	100	45	100
5.	60 MY 002	Universal Human Values	2	100	-	100	-	100
THEORY CUM PRACTICAL								
6.	61 EC 001	Digital Logic and Microprocessor	2	50	50	100	45	100
PRACTICALS								
7.	61 CS 0P3	Data Structures Laboratory	2	60	40	100	45	100
8.	60 CS 0P4	Java Programming Laboratory	2	60	40	100	45	100
9.	60 CG 0P2	Career Skill Development II	2	100	-	100	-	100
10.	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

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60 MA 010	Mathematical Statistics and Numerical Methods	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To learn basic concepts of descriptive statistics
- To familiarize various methods in hypothesis testing
- To get exposed to the fundamentals of analysis of variance
- To get exposed to various techniques to solve equations numerically
- To know the concepts of interpolation and numerical integration

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compute measures of central tendency, measures of dispersion and Correlation coefficient.	Apply
CO2	Apply Student's t-test, F-test and Chi-square test for testing the statistical hypothesis.	Apply
CO3	Apply the concepts of ANOVA to test the equality of means for more than two populations.	Apply
CO4	Employ various iteration techniques for solving algebraic, transcendental and system of linear equations.	Apply
CO5	Apply different techniques to find the intermediate values and to evaluate Single definite integrals.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	40	40	70
Analyse	0	0	0
Evaluate	0	0	0
Create	0	0	0
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous (R2022)								
60 MA 010 – Mathematical Statistics and Numerical Methods								
Common to CSE & IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Empirical Statistics Measures of Central Tendency*: Mean, Median, and Mode - Measures of Dispersion: Range - Quartile Deviation - Standard Deviation - Measures of Skewness: Bowley's Coefficient of Skewness and Pearson's Coefficient of Skewness - Karl Pearson's Coefficient of Correlation*. **Hands-On:** Calculate Mean, Median, Mode, and Range for Discrete Frequency Distribution	[9]
Testing of Hypothesis* Type I and Type II Errors - Test of Significance of Small Samples: Student's't' Test - Single Mean - Difference of Means - F-Test - Chi-Square Test - Goodness of Fit - Independence of Attributes. **Hands-On:** Apply Student's t-Test, F-Test, and Chi-Square Test to Real Dataset	[9]
Design of Experiments* Analysis of Variance - One-Way Classification - Completely Randomized Design - Two-Way Classification - Randomized Block Design - Latin Square Design. **Hands-On:** Perform One-Way ANOVA	[9]
Solution of equations and Eigen value problem Algebraic and Transcendental Equations - Newton Raphson Method – Regula Falsi Method - Gauss Elimination Method – Gauss Jordan Method - Iterative Methods: Gauss Jacobi Method – Gauss Seidel Method - Eigenvalue of a Matrix by Power Method. **Hands-On:** Visualize the Iterative Methods for Solving Linear System of Equations	[9]
Interpolation and Numerical Integration Lagrange's and Newton's Divided Difference Interpolation (Unequal Intervals) - Newton's Forward and Backward Interpolation (Equal Intervals) -** Two-Point and Three-Point Gaussian Quadrature - Trapezoidal, Simpson's 1/3 and 3/8 Rule (Single Integral). **Hands-On:** Numerical Integration by Trapezoidal and Simpson's Rules	[9]
Total Hours: 45 + 5(Hands on) + 10(Tutorial)	**45**

Text Book(s):	
1.	Gupta S. P., "Statistical Methods", 46th Revised Edition, Sultan Chand & Son, New Delhi, 2021.
2.	Faires, J. D. and Burden, R., "Numerical Methods", 4th Edition, Brookes / Cole (Thomson Publications), New Delhi, 2011.
Reference(s):	
1.	Kapoor V. K., and Gupta S. C., "Fundamentals of Mathematical Statistics'', 12th Edition, Sultan Chand & sons, New Delhi, 2020.
2.	Johnson, R. A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", 8th Edition, Pearson Education, Asia, 2023.
3.	Grewal, B. S., and Grewal, J. S., "Numerical Methods in Engineering and Science", 10th Edition, Khanna Publishers, New Delhi, 2015.
4.	Kandasamy P., Thilagavathy K. and Gunavathi K., "Numerical Methods", 3rd Edition, S.Chand & Company Ltd, New Delhi, 2003.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Empirical Statistics**	
1.1	Measures of Central Tendency: Mean and Median	2
1.2	Measures of Central Tendency: Mode	1
1.3	Measures of Dispersion: Range	1
1.4	Measures of Dispersion: Quartile Deviation and Standard Deviation	2
1.5	Measures of Skewness: Bowley's Coefficient of Skewness	1
1.6	Measures of Skewness: Pearson's Coefficient of Skewness	1
1.7	Karl Pearson's Coefficient of Correlation	1
1.8	Tutorial	2
1.9	Hands-On	1
2	**Testing of Hypothesis**	
2.1	Type I and Type II Errors	1
2.2	Test of Significance of Small Samples: Student's 'T' Test for Single Mean	2
2.3	Test of Significance of Small Samples: Student's 'T' Test for Difference of Means	2
2.4	F-Test	1
2.5	Chi-Square Test for Goodness of Fit	1
2.6	Chi-Square Test for Independence of Attributes	2
2.7	Tutorial	2
2.8	Hands On	1
3	**Design of Experiments**	
3.1	Analysis of Variance: One Way Classification	2
3.2	Completely Randomized Design	1
3.3	Two-Way Classification	2
3.4	Randomized Block Design	2
3.5	Latin Square Design	2
3.6	Tutorial	2
3.7	Hands On	1
4	**Solution of Linear equations and Eigen value problems**	
4.1	Algebraic and Transcendental Equations	1
4.2	Newton Raphson Method	1
4.3	Regula-Falsi Method	2
4.4	Gauss Elimination Method	1

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4.5	Gauss Jordan Method	1
4.6	Iterative Methods of Gauss Jacobi and Gauss Seidel	2
4.7	Eigen Values of a Matrix by Power Method	1
4.8	Tutorial	2
4.9	Hands On	1
5	**Interpolation and Numerical Integration**	
5.1	Lagrange's Interpolation	1
5.2	Newton's Divided Difference Interpolation	1
5.3	Newton's Forward and Backward Interpolation	2
5.4	Numerical Integration: Two Point and Three Point Gaussian Quadrature's	1
5.5	Trapezoidal Rule	1
5.6	Simpson's 1/3 Rule	1
5.7	Simpson's 3/8 Rule	2
5.8	Tutorial	2
5.9	Hands On	1
	Total	**60**

Course Designer(s)

1. Dr. S.Muthukumar–muthukumar@ksrct.ac.in

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60 CS 003	Data Structures	Category	L	T	P	Credit
		BS	3	0	0	3

Objectives

- To choose the appropriate data structure for a specified application
- To design and implement abstract datatypes such as Linked List, Stack, Queue and Trees
- To Learn and implement the Hashing techniques
- To design a Priority Queue ADT and its applications
- To demonstrate various Sorting, Searching and Graph algorithms

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply linear data structures to solve real time applications	Apply
CO2	Experiment with trees and its operations	Apply
CO3	Apply algorithm for solving problems like sorting and searching	Apply
CO4	Implement priority Queue with its operations and Hashing Techniques.	Apply
CO5	Analyse Shortest Path and Minimum Spanning Tree algorithms and Biconnectivity	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	2	-	-	2	2	-	-	2	3	3	-
CO2	3	3	2	3	2	-	-	2	3	-	-	2	3	3	-
CO3	3	3	2	2	2	2	-	2	3	2	-	2	3	3	-
CO4	3	3	2	3	2	-	-	3	2	2	-	2	3	3	-
CO5	3	3	2	3	2	2	2	3	3	2	-	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	30	20
Apply	40	20	40
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S. Rangasamy College of Technology–Autonomous R2022								
60 CS 003 – Data Structures								
Common to CS, IT, AD, EE, EC								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	**3**	**0**	**0**	**45**	**3**	**40**	**60**	**100**

Lists, Stacks and Queues* Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT.	[12]
Trees* Preliminaries - Binary Trees - The Search Tree ADT - Binary Search Trees - AVL Trees - Tree Traversals – B-Trees - B+ Trees.	[9]
Sorting and Searching* Preliminaries - Insertion Sort - Shell Sort - Heap Sort - Merge Sort - Quick Sort – External Sorting - Searching: Sequential Search - Binary Search – Hashed List Searches.	[7]
Hashing and Priority Queues (Heaps)* Hashing – Hash Function - Separate Chaining - Open Addressing - Rehashing - Extendible Hashing - Priority Queues (Heaps) - Mode l - Simple Implementations –Binary Heap–Applications of Priority Queues - d-Heaps.	[7]
Graphs* Definitions - Topological Sort - Shortest-Path Algorithms - Unweighted Short Paths – Dijkstra's Algorithm - Minimum Spanning Tree - Prim's Algorithm, Kruskal's Algorithm – Applications of Depth-First Search - Undirected Graphs – Biconnectivity.	[10]
Total Hours:	**45**

Text Book(s):	
1.	Weiss M.A., "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, 2008.
2.	Langsam Y, M.J.Augenstein and Tenenbaum A.M., "Data Structures using C", Pearson Education Asia, 2009.
Reference(s):	
1.	Rajesh K.Sukla, "Data Structure using C & C++", Wiley India, 2012.
2.	Tannenbaum A, "Data Structure using C", Pearson Education, 2003.
3.	Goodrich and Tamassia, "Data Structures and Algorithms in C++", Second Edition, John Wiley and Sons, 2011
4.	Reema Thareja, "Data Structures using C", Second Edition, Oxford Higher Education, 2014.

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Lists, Stacks and Queues**	
1.1	Abstract Data Type (ADT)	2
1.2	List ADT	4
1.3	Stack ADT	3
1.4	Queue ADT	3
20	**Trees**	
2.1	Preliminaries	1
2.2	Binary Trees	1
2.3	The Search Tree ADT	1
2.4	Binary Search Trees	1
2.5	AVL Trees	1
2.6	Tree Traversals	1
2.7	B-Trees	2
2.8	B+ Trees	1
3.0	**Sorting and Searching**	
3.1	Preliminaries, Insertion Sort	1
3.2	Shell Sort, Heap sort	1
3.3	Merge Sort, Quick sort	1
3.4	External Sorting	1
3.5	Sequential Searching	1
3.6	Binary Searching	1
3.7	Hashed List Searches	1
4.0	**Hashing and Priority Queues (Heaps)**	
4.1	Hashing, Hash Function	1
4.2	Separate Chaining, Open Addressing	1
4.3	Rehashing, Extendible Hashing	1
4.4	Priority Queues (Heaps)	1
4.5	Simple Implementations, Binary Heap	1
4.6	Applications of Priority Queues	1
4.7	d –Heaps	1
5.0	**Graphs**	
5.1	Graph Definitions - Topological Sort	1
5.2	Shortest-Path Algorithms	1
5.3	Unweighted Shortest Paths	1
5.4	Dijkstra's Algorithm	1
5.5	Minimum Spanning Tree	1
5.6	Prim's Algorithm	1
5.7	Kruskal's Algorithm	1
5.8	Applications of Depth-First Search	1
5.9	Undirected Graphs	1
5.10	Biconnectivity	1
	Total Hours	**45**

Course Designers

1. **Ms.J.MYTHILI - mythili@ksrct.ac.in**

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60 CS 004	Java Programming	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To learn object oriented programming concepts
- To develop applications using java concepts
- To create programs using Java strings and IO streams
- To implement code reduction through packages and collection methods
- To build applications with JDBC technology for real world problems

Pre-requisites

- Basic knowledge of any programming language with ability to solve logical problems

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply Java fundamentals to construct functional programs to solve real-world problems	Apply
CO2	Implement object-oriented principles, exception handling and string operations to solve real world problems	Apply
CO3	Design packages and utilize collections to achieve reusability	Apply
CO4	Apply multithreading concepts and IO Streams in various real world scenario	Apply
CO5	Explore database using regular expression with JDBC	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	3	-	-	-	3	3	2	3	3	-	-
CO2	3	3	2	-	3	-	-	2	3	3	2	3	3	2	-
CO3	2	3	3	-	3	-	-	2	3	3	2	3	3	2	-
CO4	3	3	3	2	3	-	-	-	3	3	2	3	3	2	-
CO5	2	3	3	2	3	-	-	-	3	3	2	3	3	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	20	10
Understand	10	30	10
Apply	40	10	70
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology–Autonomous R2022								
60 CS 004 - Java Programming								
COMMON TO CSE & IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	**3**	**0**	**0**	**45**	**3**	**40**	**60**	**100**

Introduction of Java Fundamentals and Oop* Features of Java, The Java Environment, Java Source File Compilation, Structure of Java, Data Types, Variables, Operators, Control Flow, Arrays, Concepts of Object- Oriented Programming - OOP in Java, Defining Classes and Methods in Java, Constructors, Access Specifiers, Final and Static Keywords.	**[9]**
Java Oop Concepts And Strings* Java Inheritance, Polymorphism, Interfaces, Abstract Class, Exception Handling - Exception Hierarchy, Throwing and Catching Exceptions, Built-In Exceptions, Creating Own Exceptions, String Handling with String and String Buffer Classes.	**[9]**
Packages and Collection Framework* Packages – Pre Defined and User Defined Packages, Boxing and Unboxing, Wrapper Classes, Introduction to Collection, The Collection Interfaces – List, Set, Map, Generic Class, Vector, Iterator and Listiterator, String Tokenizer.	**[9]**
Java Multithread and I/O Streams Multithreaded Programming-The Java Thread Model-Lifecycle, The Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priority, Input / Output Basics, Streams, The Byte Streams, The Character Streams, Reading and Writing Console, Reading and Writing Files, Object Serialization and Object De-Serialization.	**[9]**
Java Database Connectivity and RegEx Database Programming – Introduction, SQL Queries, JDBC, Statement, Prepared Statement**, Regular Expression: Matcher Class, Pattern Class and Pattern Syntax, Exception Class, RegEx Character Classes and Quantifiers, MetaCharacters.	**[9]**
Total Hours:	**45**

Text Book(s):	
1.	Herbert Schildt, “Java : The complete Reference”, Comprehensive coverage of the Java language, Oracle press, 12th Edition, Tata McGraw-Hill, 2021.
2.	Vivian Siahaan, Rismon Hasiholan Sianipar, “Java In Practice: JDBC And Database Applications” Sparta Publishing, Kindle 1st Edition, 2019
Reference(s):	
1.	Kathy Sierra ,Bert Bates, “Head First Java”, A Brain Friendly Guide, O’Reilly, 3nd Edition, 2022
2.	Cay S.Horstmann, “ Core Java Volume – I Fundamentals”,’ 11th Edition, 2018
3.	Y.Daniel Liang, “Introduction to Java Programming”, Comprehensive Version,10th Edition, Pearson Education,2015 [JDBC only]
4.	Jeffrey E. F. Friedl, "Mastering Regular Expressions", 3rdEdition, O'Reilly Media, Inc.,2006

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Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1.0	**Introduction to OOP and Java Fundamentals**	
1.1	Object Oriented Programming - Objects and Classes	1
1.2	Data Abstraction, Data Encapsulation	1
1.3	Inheritance, Polymorphism ,OOP in Java	1
1.4	Features of Java , The Java Environment	1
1.5	Java Source File Compilation, Structure of Java	1
1.6	Defining Classes and Methods in Java	1
1.7	Constructors, Final Keyword, Finalize Method	1
1.8	Static Members, Data Types, Variables	1
1.9	Operators, Control Flow	1
2.0	**Java Concepts**	
2.1	Arrays	1
2.2	Java Inheritance	1
2.3	Abstract Class, Interfaces	1
2.4	Exception Handling - Exception Hierarchy, Throwing and Catching Exceptions	1
2.5	Built-In Exceptions, Creating Own Exceptions	1
2.6	Multithreaded Programming-The Java Thread Model	1
2.7	The Main Thread, Creating a Thread	1
2.8	Creating Multiple Threads	1
2.9	Thread Priority, Synchronization	1
3.0	**Strings and Java I/O**	
3.1	String Handling with String	1
3.2	String Handling with StringBuffer	1
3.3	Input / Output Basics, Streams	1
3.4	The Byte Streams	1
3.5	The Character Streams	2
3.6	Reading and Writing Console, Reading and Writing Files	1
3.7	Object Serialization and Object De-Serialization	1
3.8	The Keyword Transient	1
4.0	**Packages And Collection Framework**	
4.1	Packages	1
4.2	Creating Our Own Packages	1
4.3	Import and Static Import, Wrapper Classes	1
4.4	Generic Programming , Object Cloning	1
4.5	Introduction to Collection, The Collection Interfaces- List, Set, Map	1
4.6	The Collection Classes - ArrayList, LinkedList, Vector	1
4.7	TreeSet, HashSet, LinkedHashSet	1
4.8	TreeMap and HashMap,	1
4.9	Using Iterator and ListIterator, StringTokenizer	1
5.0	**Regex and Java Database Connectivity**	
5.1	Regular Expression: Matcher Class, Pattern Class	1
5.2	Pattern Syntax, Exception Class	1
5.3	Regex Character Classes and Quantifiers	1
5.4	Metacharacters	1
5.5	Database Programming – Introduction	1
5.6	SQL Queries	1
5.7	JDBC	1
5.8	Statement	1
5.9	Prepared Statement	1
	Total	**45**

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61 EC 001	Digital Logic and Microprocessor	Category	L	T	P	Credit
		ES	2	0	2	3

Objectives

- To learn Boolean algebra and simplification of Boolean functions
- To design and Analyse different combinational circuits
- To study the basics of synchronous sequential logic, Analyse and design sequential circuits
- To introduce the architecture and programming of 8086 microprocessors
- To perform the interfacing of peripheral devices with 8086 microprocessors

Pre-requisites

- Basic knowledge of Electrical and Electronics Engineering

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Simplify complex Boolean functions and design digital systems	Understand
CO2	Design and Analyse combinational logic circuits	Analyse
CO3	Design and Analyse synchronous sequential logic circuits	Analyse
CO4	Illustrate the architecture of 8086 microprocessor	Understand
CO5	Explain the interfacing techniques of various peripheral devices	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	2	-	-	-	-	1	1	1	3	2	-
CO2	3	3	3	3	2	-	-	-	-	1	1	1	3	2	-
CO3	3	3	3	3	2	-	-	-	-	1	1	1	3	2	-
CO4	3	3	3	3	2	-	-	-	-	1	1	1	3	2	-
CO5	3	3	3	3	2	-	-	-	-	1	1	1	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-
Understand	20	-	20	-	-	30	-
Apply	20	50	10	50	50	20	50
Analyse	10	50	20	50	50	30	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology–Autonomous R2022

B.Tech – Information Technology

61 EC 001 – Digital Logic and Microprocessor

COMMON TO CS, IT, AD

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	2	0	2	**60**	**3**	**50**	**50**	**100**

Digital Fundamentals Review of Number Systems –Binary Codes - Boolean Postulates and Laws – Boolean Function - Logic Gates- Universal Gates - Canonical and Standard Forms – Minterms and Maxterms – Sum of Products and Product of Sums - Simplification of Boolean Functions –Karnaugh Map	[6]
Combinational Circuits Design procedure – Adders - Subtractors - Multiplexer / Demultiplexer - Encoder / Decoder – Code Converters	[6]
Sequential Circuits Flip flops SR, JK, T, D and Master Slave – Characteristic table and equation – Analysis of clocked sequential circuits - Ripple counters – Synchronous counters – Modulo-n counters – Registers : Shift registers	[6]
8086 Microprocessor Architecture of 8086 – Execution unit – Bus Interface unit- Addressing modes – Instruction set of 8086: Data transfer Instructions – Branch Instructions - Logical Instructions - Arithmetic Instructions – Shift and rotate Instructions - Simple AssemblyLanguage Programs of 8086	[6]
Peripherals Interfacing Programmable Peripheral Interface (PPI 8255) – Programmable Interval Timer (PIT 8253) – Programmable Interrupt Controller (8259) – Interfacing Serial I /O (8251)	[6]
Practical: 1 Verification of Boolean theorems using logic gates 2. Implementation of combinational circuits using gates for arbitrary functions 3. Implementation of binary adder/subtractor circuits 4. Implementation of code converters 5. Implementation of synchronous counters 6. Implementation of asynchronous counters 7. Implementation of basic arithmetic operations using 8086 8. Implementation of sorting and searching using 8086 9. Interfacing and programming of Programmable Peripheral Interface using 8086	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Morris Mano M., Michael D. Ciletti, “Digital Design”, 5th Edition, Pearson Education, New Delhi, 2016.
2.	Soumitra Kumar Mandal, “Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 and 8051”, 7th Edition, McGraw Hill India, 2013.

Reference(s):

1.	Donald P.Leach and Albert Paul Malvino, GoutamSaha, “Digital Principles and Applications”, 7th Edition, Tata McGraw-Hill, New Delhi, 2016.
2.	Charles H.Roth, “Fundamentals of Logic Design”, 5th Edition, Brooks/cole, 2016.
3.	Yu-Cheng Liu, Glenn A. Gibson, “Microcomputer Systems: The 8086/8088 Family - Architecture Programming and Design”, 2nd Edition, Pearson, 2015.
4.	Krishna Kant, “Microprocessors and Microcontrollers Architecture , Programming and System design 8085,8086,8051,8096”,PHI-Third Printing, 2010

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1	**Digital Fundamentals**	
1.1	Review of Number Systems, Binary codes	1
1.2	Boolean Postulates and Laws, Logic Gates- Universal Gates	1
1.3	Canonical and Standard Forms – Minterms and Maxterms, SOP, POS	1
1.4	Simplification of Boolean Functions	1
1.5	Karnaugh Map	2
2	**Combinational Circuits**	
2.1	Design procedure , Adders, Serial,Parallel adder	1
2.2	Subtractors, BCD adder	1
2.3	Magnitude Comparator	1
2.4	Multiplexer / Demultiplexer	1
2.5	Encoder / Decoder	1
2.6	Code Converters	1
3.0	**Sequential Circuits**	
3.1	Flip flops SR, JK, T, D, Master Slave, Characteristic table and equation	1
3.2	Analysis of clocked sequential circuits	1
3.3	Ripple counters, Modulo-n counters	1
3.4	Synchronous counters	1
3.5	Registers, Shift registers - Universal shift register	1
3.6	Shift counters	1
4	**8086 Microprocessor**	
4.1	Architecture of 8086	1
4.2	Execution Unit – Bus Interface Unit	1
4.3	Addressing Modes	1
4.4	Instruction set of 8086: Data transfer Instructions	1
4.5	Branch, Logical, Arithmetic, Shift and Rotate Instructions,	1
4.6	Simple Assembly Language Programs of 8086	1
5	**Peripherals Interfacing**	
5.1	Programmable Peripheral Interface (PPI 8255)	1
5.2	Programmable Interval Timer (PIT 8253)	1
5.3	Programmable Interrupt Controller (8259)	1
5.4	Keyboard & Display controller (8279)	1
5.5	Interfacing Serial I /O (8251)	1
Practical:		
1.	Verification of Boolean theorems using Logic Gates	2
2.	Verification of Boolean theorems using Logic Gates	2
3.	Implementation of Combinational Circuits Using Gates for Arbitrary Functions	3
4.	Implementation of Binary Adder/Subtractor Circuits	4
5.	Implementation of Code Converters	4
6.	Implementation of Synchronous Counters	4
7.	Implementation of Asynchronous Counters	4
8.	Implementation of Basic Arithmetic Operations Using 8086	3
9.	Implementation of Sorting and Searching Using 8086	4

Course Designer(s)

1. Dr.J.Nithya - nithyaj@ksrct.ac.in

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60 IT 301	Software Engineering	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To gain knowledge about various software development lifecycle (SDLC) models.
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures
- To impart skills in the design and implementation of efficient software systems across disciplines

Pre-requisites

- Basic knowledge of UML Concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the principles of the engineering processes in software development.	Understand
CO2	Implement the software development processes activities from requirements to validation and verification	Apply
CO3	Classify and specify the requirements for the software projects	Understand
CO4	Apply benchmarking standards in process and in product.	Apply
CO5	Use knowledge, techniques, skills and modern tools necessary for software engineering practice	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	-	3	2	-	3	2	-	2	3	3	2
CO2	3	3	2	2	-	3	2	-	3	2	-	2	3	3	2
CO3	3	3	2	2	-	3	2	-	3	2	-	2	3	3	2
CO4	3	3	2	2	-	3	2	-	3	2	-	2	3	3	2
CO5	3	3	2	2	-	3	2	-	3	2	-	2	3	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	30	30
Understand	10	10	40
Apply	20	20	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology–AutonomousR2022								
60 IT 301-Software Engineering								
IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	**3**	**0**	**0**	**45**	**3**	**40**	**60**	**100**

Software Process and Agile Development The Nature of Software - The Software Process - Software Engineering Practice - Software Myths - A Genetic Process Model - Perspective Process Models -Specialized Process Models- Agile Process: Extreme Programming - The XP Process	**[9]**
Modelling Requirements Requirement Engineering Tasks -Requirements Elicitation – Negotiation Requirements & Validation Requirements- Requirement Analysis- Scenario Based Modeling –UML Models- Flow Oriented Modeling – Class Based Modeling – Creating a Behavioral Model.	**[9]**
Software Design* Design Concepts- Design Models-Architectural Styles- Architectural Design – Architectural Mapping Using Data Flow- Cohesion& Coupling- User Interface Design- Pattern Based Design: Design Patterns – Architectural Patterns	**[9]**
Software Testing* Software Testing Strategies – System Testing – Debugging – White Box Testing – Black Box Testing – Model Based Testing – Testing for Specialized Environments, Architectures and Applications – Testing Object-Oriented and Web Based Applications – User Interface Testing – Configuration Testing – Security Testing – Performance Testing.	**[9]**
Quality & Maintenance SQA; SQA Tasks, Goals, and Metrics - Software Project Management Concepts – Process and Project Metrics – Estimation for Software Projects – Project Scheduling – Risk Management – Software Configuration Management – Software Process Improvements (SPI) – The SPI Process – Capability Machine Model Integration (CMMI) – other SPI Frameworks.	**[9]**
Total Hours:	**45**

Text Book(s):	
1.	Roger S. Pressman., “Software Engineering: A Practitioner’s Approach”, 7thEdition, McGraw Hill, 2017.
2.	Ian Sommerville, “Software Engineering”, 9thEdition, Pearson Education Asia, 2011.
Reference(s):	
1.	Fairely, “Software Engineering Concepts”, McGraw Hill, reprint, 2014.
2.	James F Peters and WitoldPedryez, “Software Engineering – An Engineering Approach”, John Wiley and Sons, New Delhi, 2013.
3.	Pankaj Jalote, “An Integrated Approach to Software Engineering”, Springer Verlag, 6th Edition, 2000.
4.	http://nptel.ac.in/.

*SDG- 04- Quality Education

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Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1.0	**Software Process and Agile Development**	1
1.1	The Nature of Software , The Software Process	1
1.2	Software Engineering Practice ,Software Myths	1
1.3	A Genetic Process Model	1
1.4	Perspective Process Models	2
1.5	Specialized Process Models	2
1.6	Agile Process: Extreme Programming , The XP Process	1
2.0	**Modelling Requirements**	
2.1	Requirement Engineering Tasks	1
2.2	Requirements Elicitation	1
2.3	Negotiation Requirements & Validation Requirements	1
2.4	Requirement Analysis	1
2.5	Scenario Based Modeling	1
2.6	UML Models	1
2.7	Flow Oriented Modeling	1
2.8	Class Based Modeling	1
2.9	Creating a Behavioral Model	1
3.0	**Software Design**	
3.1	Design Concepts	2
3.2	Design Models	1
3.3	Architectural Styles , Architectural Design	1
3.4	Architectural Mapping Using Data Flow	1
3.5	Cohesion& Coupling	1
3.6	User Interface Design	1
3.7	Pattern Based Design: Design Patterns	1
3.8	Architectural Patterns	1
4.0	**Software Testing**	
4.1	Software Testing Strategies	1
4.2	System Testing , Debugging	1
4.3	White Box Testing , Black Box Testing	1
4.4	Model Based Testing,	1
4.5	Testing for Specialized Environments	1
4.6	Architectures and Applications	1
4.7	Testing Object-Oriented and Web Based Applications	1
4.8	User Interface Testing , Configuration Testing	1
4.9	Security Testing , Performance Testing	1
5.0	**Quality & Maintenance**	
5.1	SQA; SQA Tasks, Goals, and Metrics	1
5.2	Software Project Management Concepts	1
5.3	Process and Project Metrics, Estimation for Software Projects	1
5.4	Project Scheduling	1
5.5	Risk Management	1
5.6	Software Configuration Management	1
5.7	Software Process Improvements (SPI) , The SPI Process	1
5.8	Capability Machine Model Integration (CMMI), Other SPI Frameworks.	1
5.9	Tools Related Recent Trends in Software Engineering	1
	Total	**45**

Course Designers

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60 MY 002	Universal Human Values	Category	L	T	P	Credit
		MY	3	0	0	3*

Objectives

- To identify the essential complementarily between 'values' and 'skills'
- To ensure core aspirations of all human beings.
- To acquire ethical human conduct, trustful and mutually fulfilling human behaviour
- To enrich interaction with Nature
- To achieve holistic perspective towards life and profession

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the significance of value inputs in formal education and start applying them in their life and profession	Understand
CO2	Evaluate coexistence of the “I” with the body.	Analyse
CO3	Identify and evaluate the role of harmony in family, society and universal order.	Analyse
CO4	Classify and associate the holistic perception of harmony at all levels of existence and Nature	Analyse
CO5	Develop appropriate human conduct and management patterns to create harmony in professional and personal lives.	Analyse

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	3	2	-	2	3	-	-	-
CO2	-	-	-	-	-	3	-	3	3	-	-	3	-	-	-
CO3	-	-	-	-	-	3	3	3	3	-	-	3	-	-	-
CO4	-	-	-	-	-	3	3	3	3	-	-	3	-	-	-
CO5	-	-	-	-	-	3	3	3	3	3	-	3	-	-	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom’s Category	Continuous Assessment Tests(Marks)	
	1	2
Remember	10	10
Understand	10	10
Apply	20	20
Analyse	20	20
Evaluate	-	-
Create	-	-
Total	60	60

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
60 MY 002 - Universal Human Values								
Common to all Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	3	0	**0**	**45**	**3***	**100**	**00**	**100**

Introduction to Value Education Understanding Value Education-Self Exploration as the Process for Value Education-Continuous Happiness and Prosperity-The Basic Human Aspirations-Right Understanding-Relationship and Physical Facility –Happiness and Prosperity - Current Scenario – Method to Fulfill the Basic Human Aspirations	**[9]**
Harmony in the Human Being Understanding Human Being as the Co-Existence of the Self and the Body-Distinguishing Between the Needs of the Self and the Body-The Body as an Instrument of the Self-Understanding Harmony in the Self-Harmony of the Self with the Body – Programme to Ensure Self-Regulation and Health Harmony in the Family and Society	**[9]**
Harmony in the Family and Society Harmony in the Family –The Basic Unit of Human Interaction-Values in Human- to - Human Relationship –'Trust' the Foundation Value in Relationship –'Respect'- as the Right Evaluation-Understanding Harmony in the Society –Vision for the Universal Human Order.	**[9]**
Harmony in the Nature/Existence Understanding Harmony in the Nature-Interconnectedness, Self-Regulation and Mutual Fulfillment Among the Four Orders of Nature – Realizing Existence as Co-Existence at All Levels –The Holistic Perception of Harmony in Existence.	**[9]**
Implications of the Holistic Understanding Natural Acceptance of Human Values- Definitiveness of Human Conduct- A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order- Competence in Professional Ethics – Holistic Technologies, Production Systems and Management Models-Typical Case Studies – Strategies for Transition Towards Value Base Life and Profession	**[9]**
Total Hours:	**45**

Text Book(s):	
1.	"A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2.	Gaur R R, Asthana R, Bagaria G P, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics ", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2
Reference(s):	
1.	Nagaraj A,"Jeevan Vidya EkParichaya", Jeevan Vidya Prakashan Amarkantak, 1999.
2.	Tripathi A.N, "Human Values", New Age International. Publishers, New Delhi, 2004.

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Course Contents and Lecture Schedule		
S.No	**Topic**	**No. of Hours**
1	**Introduction to Value Education**	
1.1	Discussion on Present Education System and Skill Based Education	1
1.2	Understanding Value Education	1
1.3	Self Exploration as the Process for Value Education	1
1.4	Basic Human Aspirations - Continuous Happiness and Prosperity	1
1.5	Basic Requirements to Fulfill Human Aspirations - Right Understanding, Relationship and Physical Facility	1
1.6	Transformation from Animal Consciousness to Human Consciousness	1
1.7	Sources of Happiness and Prosperity – Harmony and Disharmony	1
1.8	Current Scenario and Role of Education	1
1.9	Outcome of Human Education and Method to Fulfill the Basic Human Aspirations	1
2	**Harmony in the Human Being**	
2.1	Understanding Human Being - As Co-Existence of the Self and the Body - The	1
2.2	Needs of the Self and the Body	2
2.3	Understanding Human Being - As Co-Existence of the Self and the Body - The Activities and Response of the Self and the Body	1
2.4	The Body as an Instrument of the Self	1
2.5	Understanding Harmony in the Self	2
2.6	Harmony of the Self with the Body	1
2.7	Programme to Ensure Self-Regulation and Health	1
3	**Harmony in the Family and Society**	
3.1	Harmony in the Family - Understanding Values in Human Relationships	1
3.2	Family as the Basic Unit of Human Interaction	1
3.3	Values in Human Relationships	1
3.4	Trust - The Foundation Value in Relationship	1
3.5	Respect as the Right Evaluation, The Basis for Respect, Assumed Bases for Respect Today	1
3.6	Harmony from Family to World Family: Undivided Society	1
3.7	Extending Relationship from Family to Society , Identification of the Comprehensive Human Goal	1
3.8	Programs Needed to Achieve the Comprehensive Human Goal: The Five Dimensions of Human Endeavour	1
3.9	Harmony from Family Order to World Family Order – Universal Human Order	1
4	**Harmony in the Nature / Existence**	
4.1	The Four Orders in Nature	1
4.2	Participation of Human Being in Entire Nature	1
4.3	Natural Characteristics - Tendency of Human Living with Animal Consciousness / The Holistic Perception of Harmony in Existence	1
4.4	Present Day Problems	1
4.5	Recyclability and Self-Regulation in Nature	1
4.6	Relationship of Mutual Fulfillment	1
4.7	An Introduction to Space, Co-Existence of Units in Space	1
4.8	Harmony in Existence – Understanding Existence as Co-Existence	1
4.9	Natural Characteristic of Human Living with Human Consciousness	1
5	**Implications of the Holistic Understanding**	

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5.1	Natural Acceptance of Human Values	1
5.2	Definitiveness of Ethical Human Conduct - Development of Human Consciousness	1
5.3	Identification of Comprehensive Human Goal	1
5.4	Basis for Humanistic Education and Humanistic Constitution	1
5.5	Ensuring Competence in Professional Ethics	1
5.6	Issues in Professional Ethics-The Current Scenario	1
5.7	Holistic Technologies and Production Systems and Management Models -Typical Case Studies	2
5.8	Strategies for Transition Towards Value Based Life and Profession	1
	Total	45

Course Designers

1. Dr.G.Vennila - vennila@ksrct.ac.in
2. Dr.K.Raja - rajak@ksrct.ac.in

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61 CS 0P3	Data Structures Laboratory	Category	L	T	P	Credit
		ES	0	0	4	2

Objectives

- To design and implement simple linear and nonlinear data structures
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To program for storing data as tree structure and implementation of various traversal techniques
- To implement sorting and searching techniques
- To gain knowledge of graph applications

Pre-requisites

- Programming knowledge in C language

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Demonstrate the implementation of Linear Data structures and its applications	Apply
CO2	Investigate Balanced Parenthesis and Postfix expressions with the help of Stack ADT	Apply
CO3	Implement Non-Linear Data Structure	Apply
CO4	Implement sorting and searching techniques	Apply
CO5	Implement Shortest Path and Minimum Spanning Tree Algorithm	Analyse

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	-	-	-	-	2	-	-	2	3	3	-
CO2	3	3	2	3	-	-	-	-	3	-	-	2	3	3	-
CO3	3	3	2	2	2	2	-	-	3	2	-	2	3	3	-
CO4	3	3	2	3	2	-	-	3	2	2	-	2	3	3	-
CO5	3	3	2	-	2	2	2	3	3	2	-	2	3	3	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	40	15	80	80
Analyse	10	10	20	20
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
61 CS 0P3 - Data Structures Laboratory								
IT								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	0	0	4	60	2	60	40	100

List of Experiments:

1. Implementation of List Abstract Data Type (ADT)*
2. Implementation of Stack ADT*
3. Implementation of Queue ADT*
4. Implementation of stack applications: *
   (a) Program for 'Balanced Parenthesis'
   (b) Program for 'Evaluating Postfix Expressions'
5. Implementation Search Tree ADT*
6. Implementation of Sorting Algorithms *
7. Develop a program for various Searching Techniques *
8. Implementation of Hashing Techniques *
9. Implementation of Shortest Path Algorithm*
10. Implementation of Minimum Spanning Tree Algorithm*

Lab Manual

1. "Data Structure Lab Manual", Department of Information Technology, KSRCT.

* SDG:4- Quality Education

Course Designer(s)

1. K.Poongodi - poongodik@ksrct.ac.in

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60 CS 0P4	Java Programming Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To develop programs using java fundamental concepts
- To develop programs using basic concepts of Java
- To create programs using Java strings and IO
- To design and develop the programs using collection APIs
- To build applications with JDBC technology for real world problems

Pre-requisites

- Basic knowledge of any programming language with ability to solve logical problems

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement programs using object oriented concepts	Apply
CO2	Develop programs with the concept of exception handling and multi-threading	Apply
CO3	Design programs using String and File Operations	Apply
CO4	Create applications using interfaces, packages and collections framework	Apply
CO5	Implement regular expression and develop applications using JDBC	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	3	2	-	-	-	2	-	-	2	3	3	2
CO2	3	3	2	3	2	-	-	-	2	-	-	2	3	3	2
CO3	3	3	3	2	3	-	-	-	2	-	-	2	3	3	2
CO4	3	3	3	2	2	-	-	-	2	-	-	2	3	3	2
CO5	3	3	3	2	3	-	-	-	2	-	-	2	3	3	2
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
60 CS 0P4 – Java Programming Laboratory								
IT								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
III	0	0	4	60	2	60	40	100

List of Experiments:

1. Implementation of java fundamentals to solve real world problems*
2. Demonstrate Class and method, Constructor and Inheritance *
3. Demonstrate Polymorphism, Abstract and Interface*
4. Implementation of Exception Handling to check abnormal condition*
5. Implementation of String and String Buffer*
6. Demonstrate various methods of Collection and Iterator*
7. Implementation of multithreading and IO Streams*
8. Implementation of Database Connectivity using JDBC**

Mini project: Develop an application using the concepts of Inheritance, Polymorphism, Interfaces, Packages, Exception handling and collections along with JDBC.

Lab Manual

1. "Java Programming Lab Manual", Department of Information Technology, KSRCT.

******SDG 4 – Quality Education

**SDG 17 – Global Partnership

Course Designer(s)

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60 CG 0P2	Career Skill Development II	Category	L	T	P	Credit
		CG	0	0	2	1*

Objectives

- To help learners improve their vocabulary and to enable them to use words appropriately in different academic and professional contexts
- To help learners develop strategies that could be adopted while reading texts
- To help learners acquire the ability to speak effectively in English in real life and career related situations
- To equip students with effective speaking and listening skills in English
- To facilitate learners to enhance their writing skills with coherence and appropriate format effectively

Pre-requisites

- Basic knowledge of reading and writing in English

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Listen and comprehend complex academic texts	Understand
CO2	Read and infer the denotative and connotative meanings of technical texts	Analyse
CO3	Write definitions, descriptions, narrations, and essays on various topics	Apply
CO4	Speak fluently and accurately in formal and informal communicative contexts	Apply
CO5	Appraise the verbal ability skills in the career development and professional contexts	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	-	-	2	3	3	2	3	2	-	-
CO2	-	-	-	-	-	-	-	2	3	3	2	3	-	-	-
CO3	-	-	-	-	-	-	-	2	3	3	2	3	-	2	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	-		-
CO5	-	-	-	-	-	-	-	2	3	3	2	3	-	2	2
3 - Strong; 2 - Medium; 1 – Some															

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Syllabus

K.S.Rangasamy College of Technology–AutonomousR2022								
60 CG 0P2 - Career Skill Development II								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		C	**CA**	**ES**	**Total**
III	**0**	**0**	**2**	**30**	**1***	**100**	**00**	**100**

Listening* Listening for General Information-Specific Details - Audio / Video (Formal & Informal) - Listen to Podcasts/ TED Talks/ Anecdotes / Stories / Event Narration / Documentaries and Interviews with Celebrities - Listen to a Product and Process Descriptions, Advertisements About Products or Services.	[6]
Speaking* Self-Introduction; Introducing a Friend; Conversation - Politeness Strategies - Narrating Personal Experiences / Events; Interviewing a Celebrity; Reporting / and Summarizing of Documentaries / Podcasts/ Interviews - Picture Description; Giving Instruction to Use the Product; Presenting a Product - Small Talk; Mini Presentations - Group Discussions, Debates & Role Plays.	[6]
Reading * Loud Reading vs Silent Reading, Skimming & Scanning of Passages, Reading Brochures (Technical Context), Social Media Messages Relevant to Technical Contexts and Emails - Biographies, Travelogues, Newspaper Reports and Travel & Technical Blogs - Advertisements, Gadget Reviews and User Manuals - Newspaper Articles and Journal Reports - Editorials; and Opinion Blogs.	[6]
Writing* Writing Letters – Informal and Formal – Basics and Format Orientation - Paragraph Texting, Short Report on an Event (Field Trip etc.) - Definitions; Instructions; and Product /Process Description - Note-Making / Note-Taking; Recommendations; Transferring Information from Non-Verbal (Charts, Graphs to Verbal Mode) - Essay Texting.	[6]
Verbal Ability I* Reading Comprehension (MCQs) – Cloze Test - Sequencing of Sentences – Summarizing and Paraphrase – Error Detection – Spelling Test – Sentence Improvement – Preposition.	[6]
Total Hours	30

Text Book(s):	
1.	Kirpal Singh, "Automobile Engineering", 14th Edition, Standard Publishers Distributor, New Delhi, 2021.
2.	Crouse W. H., and Anglin D. L., “Automotive Mechanics”, 10th Edition, McGraw Hill Education Private Limited, New Delhi, 2017.
Reference(s):	
1.	“English for Engineers & Technologists” Orient Blackswan Private Ltd. Department of English, Anna University, 2020
2.	Norman Lewis, “Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book”, Penguin Random House India, 2020
3.	Michael McCarthy and Felicity O Dell, “English Vocabulary in Use : Upper Intermediate”, Cambridge University Press, N.York, 2012
4.	Lakshmi Narayanan, “A Course Book on Technical English” Scitech Publications (India) Pvt. Ltd. 2020

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Listening**	
1.1	Listening for General Information and Specific Details	1
1.2	Listening to Podcasts, Documentaries and Interviews with Celebrities	1
1.3	Narrating Personal Experiences	1
1.4	Reading Relevant to Technical Contexts and Emails	1
1.5	Listen to a Product and Process Descriptions	1
2.0	**Speaking**	
2.1	Self-introduction	1
2.2	Summarizing of documentaries & Picture Narration	1
2.3	Small Talk; Mini presentations	1
2.4	Group discussions, debates & role plays.	1
2.5	Group discussions	1
3.0	**Reading**	
3.1	Loud Reading vs Silent Reading, Skimming & Scanning of Passages	1
3.2	Reading Social Media Messages Relevant to Technical Contexts	1
3.3	Reading Newspaper Reports and Travel & Technical Blogs	1
3.4	Reading Advertisements, Gadget Reviews and User Manuals	1
3.5	Reading Newspaper Articles and Journal Reports	1
4.0	**Writing**	
4.1	Writing Letters – Informal and Formal	1
4.2	Paragraph Texting	1
4.3	Definitions and Instructions	1
4.4	Note-Making / Note-Taking	1
4.5	Essay Texting	1
5.0	**Verbal Ability**	
5.1	Reading Comprehension (MCQs) and Cloze Test	1
5.2	Sequencing of sentences	1
5.3	Paraphrasing and Summarizing	1
5.4	Error Detection and Spelling Test	1
5.5	Sentence Improvement – Preposition	1

Course Designer(s)

1. Dr.A.Palaniappan- palaniappan@ksrct.ac.in

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K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2025 - 2026)

FOURTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment*	End Semester Exam **	Max. Marks		
THEORY								
1.	60 MA 017	Discrete Mathematics	2	40	60	100	45	100
2.	60 IT 002	Design and Analysis of Algorithms	2	40	60	100	45	100
3.	60 IT 401	Computer Organization and Architecture	2	40	60	100	45	100
4.	60 IT 402	Database Management Systems	2	40	60	100	45	100
5.	60 IT 403	Web Technology	2	50	50	100	45	100
6.	60 OE L0*	Open Elective – I	2	40	60	100	45	100
PRACTICALS								
7.	60 IT 4P1	Database Management Systems Laboratory	2	60	40	100	45	100
8.	60 CG 0P3	Career Skill Development III	2	100	-	100	-	100
9..	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

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60 MA 017	Discrete Mathematics	Category	L	T	P	Credit
		BS	3	1	0	4

Objectives

- To get exposed to logical arguments and construct simple mathematical statements.
- To familiarize the basic concepts of set theory.
- To get exposed to different types of functions.
- To provide fundamental principles of combinatorial counting techniques.
- To familiarize the basic concepts of graph theory

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the logical arguments and construct simple mathematical statements	Apply
CO2	Apply the basics of set theory to the situations involving inclusion and exclusion.	Apply
CO3	Describe the concepts of different types of functions.	Apply
CO4	Apply permutation and combination in real-time situations and solve recurrence relations.	Apply
CO5	Employ the basics of graph theory in computer networks.	Apply

Mapping with Programme Outcomes

COs	POs											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	2	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	10	10	20
Apply	40	40	70
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.E & B. Tech – CSE & IT								
60 MA 017 – Discrete Mathematics								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	**3**	**1**	**0**	**60**	**4**	**40**	**60**	**100**

Mathematical Logic*, ** Propositional Logic-Propositional Equivalences- Predicates and Quantifiers- Rules of Inference. **Hands-On:** Generate the Truth Table for Mathematical Logic	[9]
Set Theory*, ** Algebra of Sets - The Power Set - Ordered Pairs and Cartesian Product -Principle of Inclusion and Exclusion - Relations on Sets -Types of Relations and Their Properties - Equivalence Relations - Relational Matrix and the Graph of Relation - Operations on Relations. **Hands-On:** Compute Various Functions for Set Operations like Union and Intersection	[9]
Functions *, ** Functions -Types of Functions - Injective, Surjective, and Bijective Functions -Composition of Functions - Inverse Functions - Primitive Recursive Functions -Permutation Functions. **Hands-On:** Find the Composition of Functions	[9]
Combinatorics*, ** Permutations and Combinations- Pigeonhole Principle -Mathematical Induction-Recurrence Relations -Generating Functions. **Hands-On:** Compute Permutations and Combinations	[9]
Graph Theory*, * Graphs- Types of Graphs- Matrix Representation of Graphs- Graph Isomorphism- Walk -Path- Cycles- Eulerian Graphs -Hamiltonian Graphs- Planar Graphs- Euler Formula- Shortest Path Algorithm: Dijkstra's Algorithm. **Hands-On:** Solve the Problem About Isomorphism of Two Graphs	[9]
Total Hours: 45 + 5(Hands-on) + 10(Tutorial)	**60**

Text Book(s):

1.	Grimaldi R. P., "Discrete and Combinatorial Mathematics : An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2014.
2.	Tremblay J. P and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", McGraw–Hill Education Private Limited, New Delhi, 49th reprint 2016.

Reference(s):

1.	Rosen K. H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2.	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2003.
3.	Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics" Fifth Reprint, Tata McGraw Hill Publishing Company Limited, 2008.
4.	Lipschutz S., Lipson M and Patil V. H., "Discrete Mathematics", 3rd Edition, Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2010.

*SDG 4: Quality education.

**SDG 9: Promote inclusive and sustainable industrialization.

*** SDG12: Production Patterns.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Mathematical Logic**	
1.1	Propositional Logic	2
1.2	Propositional Equivalences	2
1.3	Rules of Inference	2
1.4	Predicate	1
1.5	Quantifiers	2
1.6	Tutorial	2
1.7	Hands-On	1
2	**Set Theory**	
2.1	Algebra of Sets	1
2.2	The Power Set, Ordered Pairs, and Cartesian Product	1
2.3	Principle of Inclusion and Exclusion	2
2.4	Types of Relations and Their Properties	1
2.5	Equivalence Relations	2
2.6	Relational Matrix and the Graph of Relation	1
2.7	Operations on Relations	1
2.8	Tutorial	2
2.9	Hands-On	1
3	**Functions**	
3.1	Functions	1
3.2	Types of Functions	1
3.3	Composition of Functions	1
3.4	Inverse Functions	2
3.5	Primitive Recursive Functions	2
3.6	Permutation Functions	2
3.7	Tutorial	2
3.8	Hands-On	1
4	**Combinatorics**	
4.1	Permutations and Combinations	2
4.2	Pigeonhole Principle	1
4.3	Mathematical Induction	2
4.4	Recurrence Relations	2
4.5	Generating Functions	2
4.6	Tutorial	2
4.7	Hands-On	1
5	**Graph Theory**	
5.1	Types of Graphs	1
5.2	Matrix Representation of Graphs	1
5.3	Graph Isomorphism	2
5.4	Eulerian Graphs and Hamiltonian Graphs	2
5.5	Planar Graphs and Euler Formula	2
5.6	Shortest Path Algorithm: Dijkstra's Algorithm	1
5.7	Tutorial	2
5.8	Hands-On	1

Course Designer(s)

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60 IT 002	Design and Analysis of Algorithms	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To design algorithms in both the science and practice of computing.
- To choose the appropriate data structure and algorithm design method for a specified Application
- To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
- To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- To solve NP-hard and NP-complete problems.

Pre-requisites

- Basic knowledge of Data Structures and Computer programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Classify the problem types and compare orders of growth to represent asymptotic notations	Understand
CO2	Apply and inspect recursive and non-recursive algorithms by mathematical notations using sample algorithms.	Analyse
CO3	Apply ‘Brute Force’ and ‘Divide and conquer’ design techniques for sorting and searching problems	Analyse
CO4	Construct analogous algorithms for graph related problems.	Understand
CO5	Apply ‘Backtracking’ and ‘Branch and bound’ techniques to solve NP-hard problems.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	-	-	-	-	-	2	-	-	3	2	-
CO2	3	3	3	2	-	-	-	-	-	2	-	-	3	2	-
CO3	3	3	3	2	3	-	-	-	-	2	-	-	3	2	-
CO4	3	3	3	2	-	-	-	-	-	2	-	-	3	2	-
CO5	3	3	3	2	3	-	-	-	-	2	-	-	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom’s Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	-	-	10
Understand	20	20	20
Apply	20	20	40
Analyse	20	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
Common to CSE & IT								
60 IT 002 - Design and Analysis of Algorithms								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Basic Concepts of Algorithms Introduction - Fundamentals of Algorithmic Problem Solving - Important Problem Types - Fundamentals of the Analysis of Algorithm Efficiency - Analysis Framework - Asymptotic Notations and Basic Efficiency Classes - Recurrence Relations: Methods for Solving Recurrence Relations.	[9]
Mathematical Analysis of Algorithms Mathematical Analysis of Non-recursive Algorithms and Examples - Mathematical Analysis of Recursive Algorithms - Example: Fibonacci numbers - Empirical Analysis of Algorithms.	[9]
Brute Force and Divide & Conquer Techniques* Selection Sort and Bubble Sort - Brute-Force String Matching - Merge Sort - Multiplication of Two n-Bit Numbers - Quick Sort - Binary Search - Binary Tree Traversal and Related Properties.	[9]
Algorithm Design Paradigm* Decrease and Conquer Technique: Insertion Sort - Depth First Search and Breadth First Search – Transform and Conquer Technique: Presorting - Dynamic Programming: Computing a Binomial Coefficient - Warshall's and Floyd's Algorithm - The Knapsack Problem and Memory Functions - Optimal Binary Search Trees – Greedy Technique: Huffman Trees.	[9]
NP Hard and NP-Complete Problems* P and NP Problems - NP Complete Problems - Backtracking: N-Queen's Problem - Hamiltonian Circuit Problem Branch and Bound Techniques: Traveling Salesman Problem.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithm", 3rd Edition, Tenth Impression, Pearson Education Asia, 2017.
2.	Cormen T.H., Leiserson C.E., Rivest R.L and Stein C., "Introduction to Algorithms", 3rd Edition, PHI Pvt. Ltd., 2012.
Reference(s):	
1.	Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2010.
2.	Aho A.V., Hopcroft J.E and Ullman J.D., "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2003.
3.	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms/ C++", 2nd Edition, Universities Press, 2007.
4.	Anany Levitin, "Introduction to the Design & Analysis of Algorithms", 2nd Edition, Pearson Education, 2011.

* SDG- 04- Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Concepts of Algorithms**	
1.1	Fundamentals of Algorithmic Problem Solving	1
1.2	Important Problem Types	1
1.3	Fundamentals of the Analysis of Algorithm Efficiency	1
1.4	Analysis Framework	1
1.5	Asymptotic Notations	1
1.6	Asymptotic Notations and Basic Efficiency Classes	1
1.7	Recurrence Relations	1
1.8	Methods for Solving Recurrence Relations	2
2.0	**Mathematical Analysis of Algorithms**	
2.1	Mathematical Analysis of Non-Recursive Algorithms	2
2.2	Non-Recursive Algorithms and Examples	2
2.3	Mathematical Analysis of Recursive Algorithms	2
2.4	Fibonacci Numbers	1
2.5	Empirical Analysis of Algorithms.	2
3.0	**Brute Force and Divide & Conquer Techniques**	
3.1	Selection Sort	1
3.2	Bubble Sort	1
3.3	Brute-Force String Matching	1
3.4	Merge Sort	1
3.5	Multiplication of Two n-Bit Numbers	1
3.6	Quick Sort	1
3.7	Binary Search	1
3.8	Binary Tree Traversal	2
4.0	**Algorithm Design Paradigm**	
4.1	Decrease and Conquer Technique: Insertion Sort	1
4.2	Depth First Search and Breadth First Search	1
4.3	Transform and Conquer Technique: Presorting	1
4.4	Dynamic Programming: Computing a Binomial Coefficient	1
4.5	Warshall's and Floyd's Algorithm	1
4.6	The Knapsack Problem and Memory Functions	1
4.7	Optimal Binary Search Trees	1
4.8	Greedy Technique: Huffman Trees.	2
5.0	**NP Hard and NP-Complete Problems**	
5.1	NP Hard and NP-Complete Problems	1
5.2	P and NP Problems	1
5.3	NP Complete Problems	2
5.4	Backtracking: N-Queen's Problem	2
5.5	Hamiltonian Circuit Problem	1
5.6	Branch and Bound Techniques	2
	Total	**45**

Course Designer(s)

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60 IT 401	Computer Organization and Architecture	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the basic structure and operation of a computer system
- To impart the knowledge on the state of art of memory systems
- To explore the basic processing unit and I/O organization
- To Analyse the parallel processing techniques
- To examine the components involved in the design of a embedded computer system

Pre-requisites

- Basic knowledge of Electrical and Electronics Engineering and Digital logic and Microprocessor

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the basic functional units of a computer system	Remember
CO2	Illustrate the physical and virtual memory systems	Understand
CO3	Analyse the concept of basic processing unit and I/O organization	Analyse
CO4	Examine the techniques applied for enhancing the performance of processor	Apply
CO5	Design a complete embedded computer system	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	1	2	1	1	1	1	2	3	-	-
CO2	3	2	3	2	-	1	2	1	1	1	1	2	3	-	-
CO3	3	2	3	2	-	1	2	1	1	1	1	2	3	-	-
CO4	3	2	3	-	1	1	2	1	1	1	1	2	3	1	
CO5	3	2	3	-	1	3	2	1	1	1	1	2	3	2	1
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	20	40
Apply	-	10	20
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B. Tech Information Technology								
60 IT 401- Computer Organization And Architecture								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Basic Structure of Computers Functional Units – Basic Operational Concepts – Memory Locations and Addresses – Memory Operations - Instruction Codes- Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Memory Reference Instructions - Instruction and Instruction Sequencing - Data Types - Fixed Point and Floating Point Number Representation (IEEE Format) - Representation of Signed Numbers – Arithmetic Operation on Signed Numbers	[9]
Memory System Semiconductor RAM Memories – Read Only Memories – Direct Memory Access – Memory Hierarchy - Cache Memories – Performance Considerations – Virtual Memory – Secondary Storage	[9]
Basic Processing Unit & I/O Organization* Instruction Execution – Hardware Components – Hardwired Control – Micro Programmed Control – Bus Operation – Bus Arbitration – Interface Circuits – Interconnection Standards (PCI, SCSI, USB) – Accessing I/O Devices – Interrupts	[9]
Parallel Processing* Pipeline Organization – Pipelining Issues – Data Dependencies – Memory Delays – Branch Delays - Performance Evaluation – Superscalar Operation – Shared Memory Multiprocessors – Cache Coherence - Parallel Programming for Multiprocessors	[9]
Embedded Systems Embedded Systems Examples – Microcontroller Chips for Embedded Applications – A Simple Microcontroller: Parallel and Serial I/O Interface , Counter/ Timer - Sensors and Actuators – Microcontroller Families – Design Issues	[9]
Total Hours:	**45**

Text Book(s):	
1.	Carl Hamacher, Zvonko Vranesic Safwat Zaky and Naraig Manjikian,"Computer Organisation and Embedded Systems" , 6th Edition, McGraw Hill International Edition, 2017.
2.	Morris Mano M, "Computer System Architecture", 3rd Edition, Pearson Education,2017.
Reference(s):	
1.	David A.Patterson and John L.Hennessy,"Computer Organisation & Design, the hardware / software interface", 5th Edition, Morgan Kaufmann, 2014.
2.	William Stallings, "Computer Organisation & Architecture – Designing for Performance", 9thEdition, Pearson Education, 2012.
3.	Govindarajulu B., "Computer Architecture and Organization: Design Principles and Applications", 2nd edition, Tata McGraw-Hill, 2010.
4.	Nicholas P Carter, "Computer Architecture and Organization", 2nd edition, Schaum"s Outline, Tata McGraw Hill, 2010.

*SDG 4: Quality education.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Structure of Computers**	
1.1	Functional Units	1
1.2	Basic Operational Concepts	1
1.3	Memory Locations and Addresses , Memory Operations	1
1.4	Instruction Codes, Computer Registers , Computer Instructions	1
1.5	Timing and Control - Instruction Cycle , Memory Reference Instructions	1
1.6	Instruction and Instruction Sequencing , Data Types	1
1.7	Fixed Point and Floating Point Number Representation (IEEE Format)	2
1.8	Representation of Signed Numbers, Arithmetic Operation on Signed Numbers	1
2.0	**Memory System**	
2.1	Semiconductor RAM Memories	1
2.2	Read Only Memories	1
2.3	Direct Memory Access	1
2.4	Memory Hierarchy	1
2.5	Cache Memories	2
2.6	Performance Considerations	1
2.7	Virtual Memory	1
2.8	Secondary Storage	1
3.0	**Basic Processing Unit & I/O Organization**	
3.1	Instruction Execution , Hardware Components	1
3.2	Hardwired Control	1
3.3	Micro Programmed Control	1
3.4	Bus Operation, Bus Arbitration	1
3.5	Interface Circuits	1
3.6	Interconnection Standards (PCI, SCSI, USB)	2
3.7	Accessing I/O Devices	1
3.8	Interrupts	1
4.0	**Parallel Processing**	
4.1	Pipeline Organization	1
4.2	Pipelining Issues	1
4.3	Data Dependencies	1
4.4	Memory Delays	1
4.5	Branch Delays, Performance Evaluation	1
4.6	Superscalar Operation	1
4.7	Shared Memory Multiprocessors	1
4.8	Cache Coherence	1
4.9	Parallel Programming for Multiprocessors	1
5.0	**Embedded Systems**	
5.1	Embedded Systems Examples	1
5.2	Microcontroller Chips for Embedded Applications	2
5.3	A Simple Microcontroller : Parallel and Serial I/O Interface	2
5.4	Counter/ Timer	1
5.5	Sensors and Actuators	1
5.6	Microcontroller Families	1
5.7	Design Issues	1

Course Designer(s)

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60 IT 402	Database Management Systems	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To design databases for an application domain
- To solve queries using Query languages
- To expose the fundamentals of transaction processing, recovery concepts and aware of the advanced databases.
- To gain knowledge about the Distributed databases and database security

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concepts and features of database systems and mastering in different data models	Understand
CO2	Transforming an data model into a relational database schema by effectively organizing the data using Normalization and Formulating solutions using SQL	Analyse
CO3	Master the basics of query processing, optimization and fast retrieval techniques using indexing and hashing with the familiarity of transaction processing	Apply
CO4	Understand the issues in concurrency control and familiarizing indifferent database architectures	Understand
CO5	Analyse different ways of writing a query and justify which is the effective and efficient way	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	-	2	2	2	2	2	-
CO2	3	3	3	3	2	-	-	-	-	2	2	1	2	2	-
CO3	3	2	3	2	2	-	-	-	-	2	2	1	2	2	-
CO4	3	3	2	3	2	-	-	-	-	1	1	1	2	2	-
CO5	3	2	2	3	2	-	-	-	-	1	1	1	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	20	10
Understand	10	20	40
Apply	20	20	30
Analyse	20	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
60 IT 402- Database Management Systems								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Database Concepts and Data Model Database System: Definition, Purpose, Application, Data Abstraction, Database Architecture, Database Users, Database Administrators, Instances & Schema, Data Models Entity Relationship Model: Overview, Definitions, ER diagram, Mapping Cardinalities, Reduction to Relational Schema, Extended ER Features. Relational Model: Structure of Relational Database, Keys (Primary, Foreign, Candidate, Super). Relational Query Languages: Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus.	[9]
Database Design and Querying* Relational Database Design: Overview, Features, Normalization, Normal Forms (First, Second, Third, Boyce Codd), Decomposition using Functional Dependencies and Multi-Valued Dependencies. SQL: Definition, Basic Structure, Data types, Basic Operations (DDL, DML, DCL), Set Operations, Aggregate Functions, Nested Sub-queries, Join Expression, Views, Transactions, Integrity Constraints, Authorization. PL-SQL: Definition, Basic Structure, Procedures, Functions, Cursors, Triggers, Packages.	[9]
Query Processing and Fast Retrieval* Query Processing: Basic Steps, Measures of Query Cost, Query Optimization, Equivalent Expression and Query Evaluation Plan. Indexing: Definition, Purpose, Types of Indexing, B Tree and B+ Tree. Hashing: Basic Concepts, Hash Function, Static and Dynamic Hashing, Comparison of Indexing and Hashing. Transaction: Overview, Transaction States, ACID properties, Implementation of ACID Properties, Serializability.	[9]
Concurrency Control and DB Architecture* Concurrency Control: Overview, Lock Types, Lock Based Protocols, Deadlock Conditions and Handling. Recovery Systems: Failure Classification, Storage, Recovery Algorithms. Parallel Databases: Parallelism (I/O, Inter-query, Intra-Query, Intra-operation, and Interoperation) Distributed Databases: Homogeneous vs Heterogeneous, Transaction System Architecture, Concurrency Control.	[9]
Database Security: Authentication, Authorization and Access Control, SQL Injection. **Advanced Topics:** Object Oriented and Object Relational Databases, Logical Databases, Web Databases, Distributed Databases, Data Warehousing and Data Mining.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Abraham Silberschatz, Henry F. Korth and Sudarshan S., “Database System Concepts”, 7th Edition, McGraw-Hill, 2020.
2.	Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, 7th Edition, Pearson Education, 2017.
Reference(s):	
1.	Fred R McFadden, Jeffery A. Hoffer and Mary B. Prescott, Modern Database Management, Addison Wesley, 2000.
2.	Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing, 3rd Edition, 2014.
3.	Hector Garcia – Molina, Jeffrey D.Ullman and Jennifer Widom, “Database System Implementation”, Pearson Education, 2003.
4.	Peter Rob and Corlos Coronel, “Database System, Design, Implementation and Management”, Thompson Learning Course Technology, 5th Edition, 2003.

*SDG:4- Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Database Concepts and Data Model**	
1.1	Database System,Purpose, Application, Data Abstraction	1
1.2	Database Architecture	1
1.3	Database Users, Database Administrators	1
1.4	Instances & Schema, Data Models Entity	1
1.5	Relationship Model: Overview, Definitions, ER diagram, Mapping Cardinalities	1
1.6	ER Diagram, Mapping Cardinalities	1
1.7	Structure of Relational Database, Keys	1
1.8	Relational Query Languages: Relational Algebra,	1
1.9	Tuple Relational Calculus, Domain Relational Calculus	1
2.0	**Database Design and Querying**	
2.1	Relational Database Design: Overview, Features,	1
2.2	Normalization, Normal Forms (First, Second Normal Forms)	1
2.3	Third Normal Form	1
2.4	Boyce Codd Normal Form	1
2.5	Decomposition using Functional Dependencies and Multi-Valued Dependencies.	1
2.6	SQL: Definition, Basic Structure, Data types, Basic Operations (DDL, DML, DCL),	1
2.7	Set Operations, Aggregate Functions, Nested Sub-queries,	1
2.8	Join Expression, Views, Transactions, Integrity Constraints, Authorization.	1
2.9	PL-SQL: Definition, Basic Structure, Procedures, Functions, Cursors, Triggers, Packages.	1
3.0	**Query Processing and Fast Retrieval**	
3.1	Query Processing: Basic Steps, Measures of Query	1
3.2	Query Optimization, Equivalent Expression and Query Evaluation Plan	1
3.3	Indexing: Definition, Purpose	1
3.4	CostTypes of Indexing, B Tree and B+ Tree	1
3.5	Hashing: Basic Concepts, Hash Function	1
3.6	Static and Dynamic Hashing, Comparison of Indexing and Hashing	1
3.7	Transaction: Overview, Transaction States,	1
3.8	ACID Properties	1
3.9	Serializability	1
4.0	**Concurrency Control and DB Architecture**	
4.1	Concurrency Control: Overview, Lock Types	1
4.2	Lock based Protocols, Deadlock Conditions and Handling	1
4.3	Recovery Systems: Failure Classification	1
4.4	Parallel Databases: Parallelism (I/O, Inter-query, Intra-query, Intra-operation, and Interoperation	1
4.5	Distributed Databases	1
4.6	Homogeneous vs Heterogeneous	1
4.7	Transaction System Architecture	1
4.8	Storage, Recovery Algorithms	1
4.9	Concurrency Control	1
5.0	**Database Security and Advanced Topics**	
5.1	Authentication, Authorization	1
5.2	Access Control	1
5.3	SQL Injection	1
5.4	Object Oriented and Object Relational Databases	1
5.5	Logical Databases	1
5.6	Web Databases	1
5.7	Distributed Databases	1
5.8	Data Warehousing	1
5.9	Data Mining	1

Course Designer(s)

1. Mrs. K. Mahalakshmi- mahalakshmik@ksrct.ac.in
2. Mrs. S. Keerthana - keerthanas@ksrct.ac.in

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60 IT 403	Web Technology	Category	L	T	P	Credit
		ES	1	0	4	3

Objectives

- To know various technologies are involved in basic design a web page.
- To understand the fundamentals of various style sheet are used in web pages.
- To study the fundamentals of various Scripting languages.
- To enhance the knowledge of how hierarchy of objects are used in HTML and XML.
- To explore the concepts of web applications

Pre-requisites

- Basic knowledge of java programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Categorize the issues in designing a web page by utilizing XHTML components	Apply
CO2	Optimize the performance issues in style the web pages in CSS	Apply
CO3	Incorporate JavaScript variables, operators and functions in web pages	Apply
CO4	Create Web pages with dynamic styles and validate the HTML form data using Java Scripts	Apply
CO5	Classify JSP Components and implement using Net Beans	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	3	3	2	3	3	2	3	2	2	3	3	3
CO2	3	3	3	3	3	2	3	3	2	3	2	2	3	3	3
CO3	3	3	3	3	3	2	3	3	2	3	2	2	3	3	3
CO4	3	3	3	3	3	2	3	3	2	3	2	2	3	3	3
CO5	3	3	3	3	3	2	3	3	2	3	2	2	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

(Internal Assessment: 50 Marks + End Semester examination: 50 Marks)

Assessment 1 (Presentation)		Assessment 2 (CA Test)	Assessment 3 (Model – Presentation)	
Assessment Parameters	**Marks**	**Marks**	**Assessment Parameters**	**Marks**
Problem Identification	10	Questions from CO1 to CO4 As per CA Test Pattern	Innovation	30
Innovation	30		Clarity in Presentation	10
Solution for problem	10		Demo	30
Clarity in Presentation	05		Completion of Report	20
Viva	05		Viva	10
Total	**60**	**60**	**Total**	**100**

Note:

1. For Assessment 2 (CA Test) questions from CO1 to CO4 as per the CA Test question pattern has to be followed.
2. Students should submit the project report and present their project work with necessary demonstration.
3. During End Semester Examination the student project work will be evaluated based on the above mentioned parameters.

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
B. Tech Information Technology								
60 IT 403 – Web Technology								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	1	0	4	75	3	50	50	100

Introduction to Web Programming HTML Common Tags-Lists- Tables-Images-Forms-Frames **Hands - on:** Create a Web Page using HTML to Create Your Biodata that Includes Personal Details	[9]
Cascading Style Sheets* Introduction to CSS- Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks. **Hands - on:** Create a Web Page to Create a Form Using CSS That Includes Tables and User Interface Components Such as Text Boxes, Text Areas, Buttons, Check Boxes and Combo Box. Create a Feedback Form to Enable Students to Give Their Feedback Regarding the Teacher	[9]
Client-Side Programming* Overview of JavaScript, Using JS in an HTML (Embedded, External), Data Types, Control Structures, Arrays, Functions and Scopes **Hands - on:** Design a Web Page to Include Buttons and Text Boxes for Entering 2 Numbers. Display Alert Box and Print the Result in the Web Page.	[9]
JavaScript Objects Introduction-Math Objects-Date Object-Number Object-Boolean Object-Window Object- The Document Object Model (DOM), JavaScript Events- Forms **Hands - on:** Enhancement in Created Blogging Application Using JavaScript	[9]
Java Server Pages Introduction to Java Server Pages, JSP and Servlets, Running JSP Applications, Basic JSP, Classes and JSP, Support for the Model-View-Controller Paradigm, JSP Components, JSP Related Technologies. **Hands - on:** Transform the Blogging Application from a Loose Collection of Various Resources (Servlets, HTML Documents, etc.) to an Integrated Web Application That Follows the MVC Paradigm	[9]
Total Hours :45 (Theory) + 30 (Practical)	**75**

Text Book(s):

1.	Deitel & Deitel, “Internet and World Wide Web – How to Program”, 4th Edition, Pearson Education Asia,2011
2.	Jeffrey C. Jackson, “Web Technologies – A Computer Science Perspective”, Pearson Education, 2006

Reference(s):

1.	Robert. W. Sebesta, "Programming the World Wide Web", 8th Edition, Pearson Education, 2015.
2.	Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2007
3.	Godbole A.S. and Kahate A., —Web Technologies, 3rd Edition, Tata McGraw-Hill, New Delhi, 2013
4.	www.w3schools.com

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Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1	**Introduction to Web Programming**	
1.1	Structure of HTML	1
1.2	HTML Common Tags	1
1.3	Lists	1
1.4	Tables	1
1.5	Meta Elements	1
1.6	Span	1
1.7	Images	1
1.8	Forms	1
1.9	Frames	1
2	**Cascading Style Sheets**	
2.1	Introduction to CSS	1
2.2	Syntax	1
2.3	Layout	1
2.4	Normal Flow	1
2.5	Positioning Elements	1
2.6	Floating Elements	1
2.7	Constructing Multicolumn Layouts	1
2.8	Approaches to CSS Layout	1
2.9	Responsive Design, CSS Frameworks	1
3	**Client Side Programming**	
3.1	Overview of JavaScript	1
3.2	Using JS in an HTML	1
3.3	Data types	1
3.4	Control Structures	1
3.5	Arrays	1
3.6	Variables	1
3.7	Functions	1
3.8	Scopes	1
3.9	Recursion	1
4	**JavaScript Objects**	
4.1	Introduction	1
4.2	Math Object	1
4.3	Date Object	1
4.4	Number Object	1
4.5	Boolean Object	1
4.6	Window Object	1
4.7	The Document Object Model (DOM)	1
4.8	JavaScript Events	1
4.9	Forms	1
5	**Java Server Pages**	
5.1	Introduction to Java Server Pages	1
5.2	JSP and Servlets	1
5.3	Running JSP applications	1

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5.4	Basic JSP	1
5.5	classes and JSP	1
5.6	Support for the Model	1
5.7	Controller paradigm	1
5.8	JSP Components	1
5.9	JSP related technologies	1
	Total	**45**

Course Designer(s)

Thilakraj –mthilakraj@ksrct.ac.in

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60 IT 4P1	Database Management Systems Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To understand data definitions and data manipulation commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of databases
- To be familiar with the use of a front-end tool
- To design and implementation of typical database applications

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement the Data Definition Language commands, Data Manipulation Language, Data Control Language Commands and Transaction Control Language in RDBMS.	Apply
CO2	Construct Sub queries, views and joins to retrieve data from multiple tables.	Apply
CO3	Implement the database programming with Cursors, Triggers, Procedures and Functions in PL/SQL.	Apply
CO4	Design and implement applications using ODBC.	Apply
CO5	Create and manipulate data using My SQL and NOSQL database.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3	2	3	-	-	-	2	-	-	2	3	3	2
CO2	2	3	3	2	3	-	-	-	2	-	-	2	3	3	2
CO3	2	2	3	2	3	-	-	-	2	-	-	2	3	3	2
CO4	3	2	3	2	2	-	-	-	2	-	-	2	3	3	2
CO5	3	3	2	2	3	-	-	-	2	-	-	2	3	3	2

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B. Tech Information Technology								
60 IT 4P1 - Database Management Systems Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	0	0	4	60	2	60	40	100

List of Experiments:

1. Data Definition Language (DDL) Commands in RDBMS.
2. Data Manipulation Language (DML), Data Control Language (DCL).
3. Implementation of Sub Queries.
4. Creation of Views and Joins.
5. Database Design Using ER Modeling, Normalization and Implementation for any Application. *
6. Date, String and Numeric Functions.
7. Database Programming: Implicit And Explicit Cursors
8. Procedures and Functions.
9. Embedded SQL
10. Mysql Simple Queries and Database Connectivity
11. Mini Project

Lab Manual

1.	"Database Management Systems Lab Manual", Department of Information Technology, KSRCT.

*SDG:4- Quality Education

Course Designer(s)

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2. Mrs. S. Keerthana – keerthanas@ksrct.ac.in

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60 CG 0P3	Career Skill Development - III	Category	L	T	P	Credit
		CG	0	0	2	1*

Objectives

- To help learners improve their logical reasoning skills at different academic and professional contexts.
- To help learners relate basic quantitative problems and solve them.
- To help learners Infer critically the statements with optimal conclusions and assumptions.
- To solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively
- To compute quantitative problems related to time and work, speed and distance, and simple and compound interest.

Pre-requisites

- Basic knowledge of Arithmetic and Logical Reasoning.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Deduce the topics in logical reasoning at the preliminary and intermediate level.	Analyse
CO2	Relate basic quantitative problems and solve them effectively at the preliminary level	Apply
CO3	Infer critically the statements with optimal conclusions and assumptions with the data and information given.	Analyse
CO4	Solve the quantitative problems pertaining to calculations of averages, ratio and proportions, and profit and loss effectively at the pre-intermediate level.	Apply
CO5	Compute quantitative problems related to time and work, speed and distance, and simple and compound interest at intermediate level.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	3	-	3	-	-	-	2	3	3	2	3	2
CO2	3	3	3	3	-	2	-	-	-	2	3	3	2	3	3
CO3	2	2	2	2	-	3	-	-	-	2	3	3	2	3	2
CO4	3	3	3	3	-	2	-	-	-	2	3	3	-	3	3
CO5	3	3	3	3	-	2	-	-	-	2	3	3	-	3	3
3 - Strong; 2 - Medium; 1 - Some															

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.TECH – Information Technology								
60 CG 0P3 - Career Skill Development III								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	**0**	**0**	**2**	30	**1***	**100**	**00**	**100**

Logical Reasoning * Analogies - Alpha and Numeric Series - Number Series - Coding and Decoding - Blood Relations - Coded Relations - Order and Ranking – Odd Man Out - Direction and Distance.	[6]
Quantitative Aptitude – Part 1* Number system - Squares & Cubes - Divisibility - Unit digits - Remainder Theorem - HCF & LCM - Geometric and Arithmetic progression - Surds & indices	[6]
Critical Reasoning** Syllogism - Statements and Conclusions, Cause and Effect, Statements and Assumptions - Identifying Strong Arguments and Weak Arguments – Cause and Action -Data Sufficiency	[6]
Quantitative Aptitude – Part 2* Average - Ratio and proportion – Ages – Partnership– Percentage - Profit & loss – Discount - Mixture and Allegation.	[6]
Quantitative Aptitude – Part 3*** Time & Work - Pipes and Cistern – Time, Speed & Distance - Trains - Boats and Streams - Simple interest and Compound interest.	[6]
Total Hours:	**30**

Reference(s):

1.	Aggarwal, R.S. “A Modern Approach to Verbal and Non-verbal Reasoning”, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2.	Abhijit Guha, “Quantitative Aptitude”, McGraw Hill Education, 6th edition, 2016
3.	Dinesh Khattar, “Quantitative Aptitude For Competitive Examinations”, Pearson Education (2020)
4.	Anne Thomson, “Critical Reasoning: A Practical Introduction”,Lexicon Books, 3rd edition, 2022. Warszaw

*SDG 4 – Quality Education
**SDG 8 – Decent work and Economic growth
****SDG 9 – Industry, innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Logical Reasoning**	
1.1	Analogies - Alpha and Numeric Series	1
1.2	Number Series - Coding and Decoding	1
1.3	Blood Relations - Coded Relations	2
1.4	Order and Ranking – Odd Man Out	1
1.5	Direction and Distance	1
2.0	**Quantitative Aptitude – Part 1**	
2.1	Number System	1
2.2	Squares & Cubes - Divisibility	1
2.3	Unit Digits - Remainder Theorem	1
2.4	HCF & LCM- Geometric and Arithmetic Progression	2
2.5	Surds & Indices	1
3.0	**Critical Reasoning**	
3.1	Syllogism	1
3.2	Statements and Conclusions, Cause and Effect	2
3.3	Statements and Assumptions	1
3.4	Identifying Strong Arguments and Weak Arguments	1
3.5	Cause and Action -Data sufficiency	1
4.0	**Quantitative Aptitude – Part 2**	
4.1	Average - Ratio and proportion	1
4.2	Ages – Partnership	1
4.3	Percentage	1
4.4	Profit & loss	1
4.5	Discount - Mixture and Allegation	2
5.0	**Quantitative Aptitude – Part 3**	
5.1	Time & Work	1
5.2	Pipes and cistern	1
5.3	Time, Speed & Distance - Trains	1
5.4	Boats and Streams	1
5.5	Simple interest and Compound interest	2
	Total	**30**

Course Designer(s)

1. MR.R. Poovarasan - poovarasan@ksrct.ac.in

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2024 - 2025)

FIFTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment*	End Semester Exam **	Max. Marks		
THEORY								
1.	60 IT 501	Operating Systems	2	40	60	100	45	100
2.	60 IT 502	Computer Networks	2	40	60	100	45	100
3.	61 IT 503	Embedded Systems and IOT	2	40	60	100	45	100
4.	60 IT E1*	Professional Elective – I	2	40	60	100	45	100
5.	60 OE L0*	Open Elective – II	2	40	60	100	45	100
6.	60 MY 003	Startups and Entrepreneurship	2	100	-	100	-	100
THEORY CUM PRACTICAL								
7.	61 IT 003	Design Thinking	2	50	50	100	45	100
PRACTICALS								
8.	60 IT 5P1	Operating Systems and Open Source Laboratory	2	60	40	100	45	100
9.	60 IT 5P2	Computer Networks Laboratory	2	60	40	100	45	100
10.	60 CG 0P4	Career Skill Development IV	2	100	-	100	-	100
11.	60 CG 0P6	Internship	100	-	100	-	100	-

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

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60 IT 501	Operating Systems	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the services provided by and the design of an operating system.
- To Analyse the components of an operating system have a thorough knowledge of process management.
- To understand different approaches to memory management.
- To Analyse and explain the algorithms used in Virtual Memory Management.
- To discuss the algorithms used in I/O and File Management.

Pre-requisites

- Basic knowledge of Computer

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recognize the basics of operating systems and its components	Understand
CO2	Examine the scheduling algorithms and critical section problem.	Analyse
CO3	Acquire the knowledge of Deadlock and Storage Management	Understand
CO4	Outline the memory management scheme and File concept.	Understand
CO5	Analyse the concept of allocation methods, directory structure and free space management	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO4	3	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO5	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	20	40	40
Apply	10	-	20
Analyse	10	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT 501 – Operating Systems								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Basic Concepts Introduction - Operating System Structure - Operating System Operation - Protection and Security - Distributed Systems - Operating System Services - System Calls - System Programs - Process Concept - Process Scheduling - Operations on Processes - Cooperating Processes - Inter - Process Communication.	[9]
Process Management Threads - Overview - Threading Issues - CPU Scheduling - Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Multiple - Processor Scheduling – Real Time Scheduling - The Critical Section Problem - Synchronization Hardware - Semaphores – Classic Problems of Synchronization.	[9]
Deadlocks and Memory Management Deadlocks - System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlocks - Main Memory -Storage Management - Swapping - Contiguous Memory Allocation – Paging - Segmentation - Structure of Page Table.	[9]
Virtual Memory and File System Virtual Memory - Demand Paging - Process creation - Page Replacement - Allocation of frames - Thrashing - File System Interface - File Concept - Access Methods – Directory Structure - File System Mounting - File Sharing - Protection.	[9]
I/O Systems File System Structure – File System Implementation – Directory Implementation – Allocation Methods - Free Space Management - Disk Structure – Disk Scheduling – Disk Management – Swap Space Management. Introduction to Linux OS – Linux OS Architecture	[9]
Total Hours:	**45**

Text Book(s):	
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 10th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2018.
2.	William Stallings, “Operating Systems: Internals and Design Principles”, 9th Edition, 2017.
Reference(s):	
1.	Harvey M. Deitel, “Operating Systems”, 3rd Edition, Pearson Education Pvt. Ltd, 2007.
2.	Andrew S. Tanenbaum, “Modern Operating Systems”, 4th Edition, Prentice Hall of India Pvt. Ltd, 2016.
3.	Pramod Chandra P. Bhatt, “An Introduction to Operating Systems, Concepts and Practice”,4th Edition, PHI, 2014.
4.	Milan Milenkovic, “Operating systems: Concepts and design”, McGraw-Hill; 2nd edition,1992.

*SDG 4 – Quality of Education

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Basic Concepts**	
1.1	Introduction	1
1.2	Operating System Structure - Operating System Operation	1
1.3	Protection and Security	1
1.4	Distributed Systems	1
1.5	Operating System Services	1
1.6	System Calls – System Programs	1
1.7	Process Concept - Process Scheduling	1
1.8	Operations on Processes – Cooperating Processes	1
1.9	Inter-process Communication	1
2.0	**Process Management**	
2.1	Threads – Overview – Threading Issues	1
2.2	CPU Scheduling – Basic Concepts	1
2.3	Scheduling Criteria – Scheduling Algorithms	1
2.4	Multiple - Processor Scheduling	1
2.5	Real Time Scheduling	1
2.6	The Critical-Section Problem	1
2.7	Synchronization Hardware	1
2.8	Semaphores	1
2.9	Classic problems of Synchronization	1
3.0	**Deadlocks and Memory Management**	
3.1	Deadlocks – System Model	1
3.2	Deadlock Characterization	1
3.3	Methods for Handling Deadlocks	1
3.4	Deadlock Prevention – Deadlock Avoidance	1
3.5	Deadlock detection – Recovery from Deadlocks	1
3.6	Main Memory–Storage Management	1
3.7	Swapping – Contiguous Memory allocation	1
3.8	Paging	1
3.9	Segmentation – Structure of Page Table	1
4.0	**Virtual Memory and File System**	
4.1	Virtual Memory - Demand Paging	1
4.2	Process creation - Page Replacement	1
4.3	Allocation of frames	1
4.4	Thrashing – File System Interface	1
4.5	File Concept – Access Methods	1
4.6	Directory Structure	1
4.7	File System Mounting	1
4.8	File Sharing	1
4.9	Protection	1
5.0	**I/O SYSTEMS**	
5.1	File System Structure	1
5.2	File System Implementation	1
5.3	Directory Implementation	1
5.4	Allocation Methods	1

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5.5	Free Space Management - Disk Structure	1
5.6	Disk Scheduling	1
5.7	Disk Management	1
5.8	Swap Space Management	1
5.9	Introduction to Linux OS – Linux OS Architecture	1

Course Designer(s)

1. Mrs.V.P.Dhivya-dhivyavp@ksrct.ac.in

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60 IT 502	Computer Networks	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To provide insight about networks, topologies, and the key concepts.
- To understand the principles, key protocols, design issues, and significance of each layers in OSI and TCP/IP.
- To learn the functions of network layer and routing protocols.
- To explore the concepts of congestion control and quality of services.
- To learn the working principles of application layer protocols.

Pre-requisites

- Basic knowledge of mathematics and programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Acquire Knowledge about basic network theory and layered communication architectures	Understand
CO2	Recognize the different error control techniques in data link layer	Remember
CO3	Attain solutions to various problems in network addressing and routing	Apply
CO4	Explore the concepts of congestion control and flow control techniques	Understand
CO5	Attain extensive knowledge on principles of application layer protocols.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	2	2	-	-	2	3	-	-	3	3	3
CO2	3	3	2	2	2	2	-	-	2	3	-	-	3	3	3
CO3	3	3	3	2	2	2	-	-	2	3	-	-	3	3	3
CO4	3	3	3	2	2	2	-	-	2	3	-	-	3	3	3
CO5	3	2	2	2	2	2	-	-	2	3	-	-	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	20	30
Understand	30	30	50
Apply		10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT 502 - Computer Networks								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction and Physical Layer ** Introduction - Networks - Network Types – TCP/IP Protocol Suite - OSI Model – Digital-to-Digital Conversion - Transmission Media.	[9]
Data Link Layer * Error Detection and Correction – Introduction – Cyclic Codes – CRC- Checksum - Data Link Control – DLC services – Data link layer protocols – HDLC – Wired LANsEthernet (802.3) – Standard Ethernet - Wireless LANs - 802.11.	[9]
Network Layer ** Network Layer Services – Circuit Switching - Packet Switching – Network Layer Performance - IPV4 Addresses – Address Space – IPV4 Addressing Types - IPv6 Addressing - IPv6 Protocol – IPv4 vs IPv6 – Unicast Routing - Distance Vector Routing – Link State Routing-OSPF – Multicast Routing – DVMRP.	[9]
Transport Layer ** Introduction -Transport Layer Protocols - User Datagram Protocol – Transmission Control Protocol – TCP Services - Features – Segment - TCP Connection -TCP congestion control – SCTP-Data Compression - Quality Of Services (QOS).	[9]
Application Layer ** World Wide Web and HTTP - FTP- Electronic Mail: SMTP, POP3, IMAP, MIME – Domain Name System –SNMP.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Behrouz A. Forouzan, “Data communication and Networking”, 6th Edition, Tata McGraw Hill, 2022.
2.	James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet” 8th Edition, Pearson Education, 2021.
Reference(s):	
1.	Behrouz A. Forouzan, “TCP/IP Protocol Suite”, 4thEdition, Tata McGraw Hill, 2015.
2.	Andrew S. Tanenbaum, “Computer Networks”, 4th Edition, PHI, 2003.
3.	Larry L.Peterson and Bruce S. Davie, “Computer Networks - A Systems Approach”, 4th Edition, The Morgan Kaufman Series in Networking, 2007.

*SDG 4 – Quality of Education

**SDG 9 – Industry, Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction and Physical Layer**	
1.1	Introduction	1
1.2	Networks	1
1.3	Network Types	1
1.4	TCP/IP Protocol Suite	2
1.5	OSI Model	2
1.6	Digital - to - Digital conversion	1
1.7	Transmission Media	1
2.0	**Data Link Layer**	
2.1	Error Detection	1
2.2	Error Correction	1
2.3	Cyclic Codes – CRC	1
2.4	Checksum	1
2.5	Data Link Control,Services	1
2.6	Data Link Layer Protocols - HDLC	1
2.7	Wired LANsEthernet (802.3	1
2.8	Standard Ethernet	1
2.9	Wireless LANs - 802.11	1
3.0	**Network Layer**	
3.1	Network Layer Services	1
3.2	Circuit Switching - Packet Switching	1
3.3	Network Layer Performance	1
3.4	IPV4 Addresses–Address Space – IPV4 Addressing Types	1
3.5	IPv6 Addressing- IPv6 Protocol –IPv4 vs IPv6	1
3.6	Unicast Routing - Distance Vector Routing	1
3.7	Link State Routing	1
3.8	OSPF	1
3.9	Multicast Routing – DVMRP	1
4.0	**Transport Layer**	
4.1	Introduction -Transport Layer Protocols	1
4.2	User Datagram Protocol	1
4.3	Transmission Control Protocol	1
4.4	TCP Services,Features	1
4.5	Segment - TCP Connection	1
4.6	TCP Congestion Control	1
4.7	SCTP	1
4.8	Data Compression	1
4.9	Quality of Services (QOS)	1
5.0	**Application Layer**	
5.1	World Wide Web and HTTP	1
5.2	FTP	1
5.3	Electronic Mail Protocols	1
5.4	SMTP	1
5.5	POP3	1
5.6	IMAP	1
5.7	MIME	1
5.8	Domain Name System	1
5.9	SNMP	1

Course Designer(s)

1. Mrs.S.Geetha - geethas@ksrct.ac.in

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61 IT 503	Embedded Systems and IOT	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the architecture and design principles of embedded systems
- To equip students with the skills to develop and implement embedded software
- To provide practical knowledge of IoT architecture and Arduino programming
- To equip the students to apply communication models and protocols in designing IoT
- To enable the students to develop real-time embedded applications

Pre-requisites

- Basic knowledge of Digital logic , Architecture of Microprocessors and Computer Architecture

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the architecture and key design principles of embedded systems	Understand
CO2	Apply RTOS concepts and embedded software development tools to design basic embedded applications	Apply
CO3	Develop basic IoT applications by integrating sensors and actuators with Arduino	Apply
CO4	Apply appropriate IoT communication protocols to design and implement efficient IoT communication models	Apply
CO5	Apply open platform tools to develop embedded applications on Raspberry Pi	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	2	-	-	-	-	-	-	-	-	2	2	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	2	-	-	-	-	-	-	-	2	2	-
CO4	3	2	3	2	2	-	-	-	-	-	-	-	2	2	-
CO5	2	2	3	2	3	2	-	-	-	-	-	-	2	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	Test 1	Test 2	
Remember	10	10	20
Understand	20	20	20
Apply	30	30	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

61 IT 503 / Embedded Systems and IOT

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Processor Trends in Embedded Systems Embedded Systems vs General Computing Systems – Processor embedded into a system – Embedded hardware units - Embedded Software - Classification of Embedded Systems - Embedded System-On-Chip – Design process in Embedded System – Design challenges in Embedded System design – Hardware-Software Co-design	[9]
Embedded Design Programming Introduction to Real Time Operating Systems (RTOS) – Basic design using a RTOS – Basic functions in the RTOS – Types of RTOS – MicroC/OS-II – VxWorks - Embedded Software development process – Software tools – Host and Target machines – Linking and Locating Software – Testing methods – Debugging techniques	[9]
IoT and Arduino Programming Basic Building blocks of an IoT device – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT deployment levels - Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output From Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino	[9]
IOT Communication and Protocols IoT Communication Models and APIs - IoT Communication Protocols – Bluetooth - WiFi - ZigBee - GPS - GSM Modules - IoT and M2M - IoT Platform Design Methodology - IoT Protocols: MQTT and AMQP	[9]
Applications development Open Platform Raspberry Pi – Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud - Case Studies: Home Automation, Smart Agriculture and Smart Healthcare	[9]
Total Hours	**45**

Text Book(s):

1.	Raj Kamal, “Embedded Systems: Architecture, programming and Design”, McGraw Hill Education, Third Edition, 2015
2.	Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2018

Reference(s):

1.	Shiby K V, “Introduction to Embedded Systems”, McGraw Hill Education, Second Edition, 2017
2.	Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, “IoT Fundamentals : Networking Technologies, Protocols, and Use Cases for the Internet of Things” Pearson Education, First Edition, 2017
3.	Wayne Wolf, “Computers as Components: Principles of Embedded Computer System Design”, Elsevier, 2006.
4.	Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, Second Edition, 2014

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Processor Trends in Embedded Systems**	
1.1	Embedded Systems vs General Computing Systems	1
1.2	Processor embedded into a system	1
1.3	Embedded hardware units	1
1.4	Embedded Software	1
1.5	Classification of Embedded Systems	1
1.6	Embedded System-On-Chip	1
1.7	Design process in Embedded System	1
1.8	Design challenges in Embedded System design	1
1.9	Hardware-Software Co-design	1
2.0	**Embedded Design Programming**	
2.1	Introduction to Real Time Operating Systems (RTOS)	1
2.2	Basic design using a RTOS	1
2.3	Basic functions in the RTOS, Types of RTOS	1
2.4	MicroC/OS-II	1
2.5	VxWorks	1
2.6	Embedded Software development process	1
2.7	Software tools, Host and Target machines	1
2.8	Linking and Locating Software, Testing methods	1
2.9	Debugging techniques	1
3.0	**IoT and Arduino Programming**	
3.1	Basic Building blocks of an IoT device	1
3.2	Physical Design of IoT , Logical Design of IoT	1
3.3	IoT Enabling Technologies	1
3.4	IoT deployment levels	1
3.5	Introduction to Arduino, Types of Arduino	1
3.6	Arduino Toolchain , Arduino Programming Structure	1
3.7	Sketches, Pins, Input/Output From Pins Using Sketches	1
3.8	Introduction to Arduino Shields	1
3.9	Integration of Sensors and Actuators with Arduino	1
4.0	**IOT Communication and Protocols**	
4.1	IoT Communication Models and APIs	1
4.2	IoT Communication Protocols, Bluetooth	1
4.3	WiFi , ZigBee	1
4.4	GPS , GSM Modules	1
4.5	IoT and M2M	2
4.6	IoT Platform Design Methodology	1
4.7	IoT Protocols: MQTT and AMQP	2
5.0	**Applications development**	
5.1	Open Platform Raspberry Pi, Architecture	1
5.2	Programming – Interfacing	1
5.3	Accessing GPIO Pins	1
5.4	Sending and Receiving Signals Using GPIO Pins	1
5.5	Connecting to the Cloud	2
5.6	Case Studies: Home Automation, Smart Agriculture and Smart Healthcare	3
	Total	**45**

Course Designer(s)

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61 IT 003	Design Thinking	Category	L	T	P	Credit
		PC	2	0	2	3

Objectives

- To learn the five stages of the School of Design Thinking process (Feel, Define, Divergence, Convergence, and Storytelling).
- To understand the application of design thinking for AI problem framing in enterprise environments.
- To learn the enterprise AI ecosystem, including data infrastructure, machine learning pipelines, and cloud deployment.
- To identify and apply appropriate AI/ML approaches such as predictive, generative, and agentic AI for enterprise problems.
- To design responsible, ethical, and explainable AI systems aligned with governance frameworks.

Pre-requisites

- Basic knowledge of mathematics and programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recall the principles and stages of the School of Design Thinking methodology and their relevance to enterprise AI applications.	Remember
CO2	Explain enterprise data strategies, machine learning concepts, and AI architectures used in organizational contexts.	Understand
CO3	Apply the Design Thinking process to identify and formulate AI problem statements for enterprise use cases.	Apply
CO4	Apply ethical, governance, and compliance principles, including fairness, explainability, and regulatory requirements, in enterprise AI solutions.	Apply
CO5	Apply enterprise AI techniques to prototype solutions, evaluate business impact, and communicate return on investment (ROI) to stakeholders.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	-	3	-	-	-	-	-	3	-	2	3
CO2	3	3	2	3	-	-	-	-	-	-	-	2	3	3	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	3	3	2
CO4	2	2	-	3	-	3	3	3	-	-	-	3	2	2	3
CO5	2	3	3	2	3	2	-	-	-	-	-	3	2	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	40	-	-	-	-	30	-
Understand	20	-	30	-	-	50	-
Apply	-	50	30	50	50	10	50
Analyse	-	50	-	50	50	10	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-		-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

61 IT 003 – Design Thinking

Common to CSE, CSE(AIML), AI&DS , CSBS & IT

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Foundations of Design Thinking* Introduction to Design Thinking and Human-Centred Innovation- The School of Design Thinking Framework- Human-Centred and Experience-Driven Problem Solving-Design Thinking for Enterprise AI Development -Design Thinking, Agile, and Lean Methodologies - Iterative Design Processes and Organisational Culture	[6]
Design Thinking for Enterprise AI Opportunity Identification and Validation** AI Readiness Assessment - Business Problem Identification and AI Problem Formulation- Enterprise Data Identification and Analysis – Success Metrics for AI Solutions - Stakeholder Mapping and Collaboration - Ethical and Responsible AI by Design	[6]
Enterprise AI Ecosystem and Data Strategy*** Enterprise AI Ecosystem and Open-Source Platforms- AI/ML System Architecture - Enterprise Data Strategy and Governance - Data Pipelines and Feature Engineering - Data Storage, MLOps, and LLMOps	[6]
AI/ML Architectures for Enterprise Use Cases*** Taxonomy of Enterprise AI Systems - Framework for Enterprise AI Solution Design - Time-Series Forecasting and Predictive Analytics Architectures - Classification, Recommendation, and NLP Architectures - Generative AI, RAG, and Agentic AI Systems - Multimodal AI, API Design, and Model Selection.	[6]
Responsible AI, Governance, Adoption, Integration and ROI Principles of Responsible and Ethical AI– AI Bias, Explainability, and Governance Frameworks – Privacy, Compliance, and Model Risk Management – Enterprise AI Adoption and Business Valu - AI Integration, Product Management, and Operations - Strategic Decisions and Future Trends in Enterprise AI.	[6]
Practical: 1. Students will select an enterprise persona (such as an HR officer, logistics coordinator, or finance executive) and conduct a structured empathy interview to understand the user's experiences, challenges, and needs. Based on their observations, they will develop an emotional journey map, formulate a Point of View (POV) statement, and generate “How Might We” (HMW) questions. Using brainstorming and prioritization techniques, students will identify the most promising solution and present a short story pitch demonstrating the complete Feel–Define–Diverge–Converge–Storytelling process.	**30**
2. Students will work in teams to select an enterprise domain such as Finance, Human Resources, Operations, or Customer Experience and prepare an AI Opportunity Canvas to identify business challenges, data requirements, stakeholders, and potential AI solutions. They will then conduct a stakeholder interview simulation, gather requirements from different perspectives, and refine the initial problem statement into a well-defined enterprise AI use case with measurable objectives and expected business impact.	
3. Students will explore and profile a sample enterprise dataset using Python, Pandas, and DuckDB in Google Colab to identify data quality issues, missing values, and potential feature candidates for AI applications. They will further implement semantic search by generating document embeddings using Sentence-Transformers and storing them in an open-source vector database such as ChromaDB or FAISS to perform similarity-based information retrieval for enterprise knowledge management scenarios.	
4. Students will develop and evaluate a time-series forecasting model using Prophet or LSTM on a publicly available financial or supply-chain dataset in Google Colab. They will also implement a basic Retrieval-Augmented Generation (RAG) pipeline by chunking and embedding enterprise documents using Sentence-Transformers, storing vectors in ChromaDB, and generating responses through an open-source large language model to support enterprise knowledge retrieval and question-answering applications.	

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5. Students will perform a bias audit on a sample HR or credit dataset using open-source fairness assessment tools to evaluate metrics such as demographic parity and equalized odds and propose mitigation strategies. They will also generate SHAP-based explanations for a trained classification model, interpret feature contributions, and present the results to a simulated non-technical stakeholder audience to demonstrate the principles of explainable and responsible AI in enterprise applications.	
6. Students will develop a comprehensive AI adoption plan for the enterprise use case identified in Module 2, including stakeholder mapping, key performance indicators (KPIs), governance considerations, risk assessment, and an implementation roadmap. As a capstone activity, teams will present and defend their end-to-end enterprise AI solution, covering problem identification, system architecture, model selection, ethical and governance aspects, deployment strategy, and expected business impact, followed by peer review and feedback.	
Total Hours:(Theory – 30 + Practical – 30)	60

Text Book(s):	
1.	Arun Jain, “Unmukt: Art and Science of Design Thinking”, School of Design Thinking, 2021
2.	Mark Terwilliger, "AI in Business: Building Enterprise AI Architectures and Systems", independently published, 2023.
3.	Tim Brown, "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation", HarperBusiness, 2009.
Reference(s):	
1.	Kjell Carlsson et al., "AI Engineering: Building Applications with Foundation Models", O'Reilly Media, 2024.
2.	Omar Sanseviero, Pedro Cuenca et al., "Hands-On Generative AI with Transformers and Diffusion Models", O'Reilly Media, 2024.
3.	Valentina Alto, "Modern Generative AI with ChatGPT and OpenAI Models", Packt Publishing, 2023.
4.	Thimira Amaratunga, "Understanding Large Language Models", Apress, 2023.
5.	https://purplefabric-help.intellectai.com/
6.	https://dschool.stanford.edu

* SDG-4 – Quality Education
* * SDG-8 – Employment and decent work for all
* * * SDG-9 – Industrialization and foster innovation

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Foundations of Design Thinking**	
1.1	Introduction to Design Thinking and Human Centred Innovation	1
1.2	The School of Design Thinking Framework	1
1.3	Human-Centred and Experience Driven Problem Solving	1
1.4	Design Thinking for Enterprise AI Development	1
1.5	Design Thinking, Agile, and Lean Methodologies	1
1.6	Iterative Design Processes and Organisational Culture	1
2.0	**Design Thinking for Enterprise AI Opportunity Identification and Validation**	
2.1	AI Readiness Assessment	1
2.2	Business Problem Identification and AI Problem Formulation	1
2.3	Enterprise Data Identification and Analysis	1
2.4	Success Metrics for AI Solutions	1
2.5	Stakeholder Mapping and Collaboration	1
2.6	Ethical and Responsible AI by Design	1
3.0	**Enterprise AI Ecosystem and Data Strategy**	
3.1	Enterprise AI Ecosystem and Open-Source Platforms	1
3.2	AI/ML System Architecture	1
3.3	Enterprise Data Strategy and Governance s	1
3.4	Data Pipelines and Feature Engineering	1
3.5	Data Storage, MLOps, and LLMOps	2
4.0	**AI/ML Architectures for Enterprise Use Cases**	
4.1	Taxonomy of Enterprise AI Systems	1
4.2	Framework for Enterprise AI Solution Design	1
4.3	Time-Series Forecasting and Predictive Analytics Architectures	1
4.4	Classification, Recommendation, and NLP Architectures	1
4.5	Generative AI, RAG, and Agentic AI Systems	1
4.6	Multimodal AI, API Design, and Model Selection.	1
5.0	**Responsible AI, Governance, Adoption, Integration and ROI**	
5.1	Principles of Responsible and Ethical AI–	1
5.2	AI Bias, Explainability, and Governance Frameworks	1
5.3	Privacy, Compliance, and Model Risk Management	1
5.4	Enterprise AI Adoption and Business Value	1
5.5	AI Integration, Product Management, and Operations	1
5.6	Strategic Decisions and Future Trends in Enterprise AI.	1
Practical:		
1	Students will select an enterprise persona (such as an HR officer, logistics coordinator, or finance executive) and conduct a structured empathy interview to understand the user's experiences, challenges, and needs. Based on their observations, they will develop an emotional journey map, formulate a Point of View (POV) statement, and generate “How Might We” (HMW) questions. Using brainstorming and prioritization techniques, students will identify the most promising solution and present a short story pitch demonstrating the complete Feel–Define–Diverge–Converge–Storytelling process.	5
2	Students will work in teams to select an enterprise domain such as Finance, Human Resources, Operations, or Customer Experience and prepare an AI Opportunity Canvas to identify business challenges, data requirements, stakeholders, and potential AI solutions. They will then conduct a stakeholder	5

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	interview simulation, gather requirements from different perspectives, and refine the initial problem statement into a well-defined enterprise AI use case with measurable objectives and expected business impact.	
3	Students will explore and profile a sample enterprise dataset using Python, Pandas, and DuckDB in Google Colab to identify data quality issues, missing values, and potential feature candidates for AI applications. They will further implement semantic search by generating document embeddings using Sentence-Transformers and storing them in an open-source vector database such as ChromaDB or FAISS to perform similarity-based information retrieval for enterprise knowledge management scenarios.	5
4	Students will develop and evaluate a time-series forecasting model using Prophet or LSTM on a publicly available financial or supply-chain dataset in Google Colab. They will also implement a basic Retrieval-Augmented Generation (RAG) pipeline by chunking and embedding enterprise documents using Sentence-Transformers, storing vectors in ChromaDB, and generating responses through an open-source large language model to support enterprise knowledge retrieval and question-answering applications.	5
5	Students will perform a bias audit on a sample HR or credit dataset using open-source fairness assessment tools to evaluate metrics such as demographic parity and equalized odds and propose mitigation strategies. They will also generate SHAP-based explanations for a trained classification model, interpret feature contributions, and present the results to a simulated non-technical stakeholder audience to demonstrate the principles of explainable and responsible AI in enterprise applications.	5
6	Students will develop a comprehensive AI adoption plan for the enterprise use case identified in Module 2, including stakeholder mapping, key performance indicators (KPIs), governance considerations, risk assessment, and an implementation roadmap. As a capstone activity, teams will present and defend their end-to-end enterprise AI solution, covering problem identification, system architecture, model selection, ethical and governance aspects, deployment strategy, and expected business impact, followed by peer review and feedback.	5
	Total	60

Course Designer(s)
Dr.P.Dineshkumar
Ms.S.Pavithra

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60 MY 003	Startups and Entrepreneurship	Category	L	T	P	Credit
		MY	2	0	0	2*

Objectives

- To Learn basic concepts in entrepreneurship, develop mind-set and skills necessary to explore entrepreneurship
- To provide practical proven tools for transforming an idea into a product or service that creates value for others.
- To Comprehend the process of opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution and prototypes
- To create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture ideas & solutions built with domain expertise
- To Prepare and present an investible pitch deck of their practice venture to attract stakeholders

Pre-requisites

- Basic knowledge of reading and writing in English

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop an entrepreneurial mindset and appreciate the concepts of design thinking, entrepreneurship and innovation	Understand
CO2	Apply process of problem -opportunity identification and validation through human centered approach to design thinking in building solutions	Apply
CO3	Understand market types, conduct market estimation, identify customers, create customer persona, develop the skills to create a compelling value proposition and build a Minimum Viable Product	Apply
CO4	Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture	Apply
CO5	Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	1	3	1	2	1	-	2	2	3	3	-
CO2	2	3	3	2	2	-	2	2	2	-	2	2	2	3	-
CO3	3	2	3	1	2	-	-	-	1	3	1	3	3	2	-
CO4	3	3	3	3	3	2	2	1	-	1	3	3	3	3	-
CO5	3	2	3	3	3	-	-	2	-	-	3	2	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Pitch Deck final submission & Via voce
	Milestone 1 (25 Marks)	Milestone 2 & 3 (25 Marks)	
Remember	10	-	50
Understand	05	10	
Apply	10	10	
Analyse	-	05	
Evaluate	-	-	
Create	-	-	
Total	25	25	

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 MY 003 – Startups and Entrepreneurship								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	2	0	0	30	2*	100	-	100

Introduction to Entrepreneurship & Entrepreneur Meaning and Concept of Entrepreneurship, The History of Entrepreneurship Development, Myths of Entrepreneurship, Role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management and Future of Entrepreneurship. The Entrepreneur: Meaning, The Skills Required to Be an Entrepreneur, The Entrepreneurial Decision Process, Role Models, Mentors and Support System. Innovation and Creativity, Types of Innovations, Innovations in Current Scenario	[6]
Problem-Opportunity Identification, Customers Discovery and Competitive Advantage Understanding the Problem and Opportunity, Define Problem Using Design Thinking Principles and Validate Problem. Exploring Market Types and Estimating the Market Size, Knowing Your Customer and Consumer, Customer Segmentation and Creating Customer Personas. Importance of Value Proposition, Value Proposition Canvas, Developing Problem-Solution Fit, Competition Analysis, Blue Ocean Strategy, Competitive Positioning and Understanding Unique Selling Points.	[6]
Business Model and Build Your MVP Introduction to Business Model and Types, Lean Approach, 9 Block Lean Canvas Model, Riskiest Assumptions to Business Models. Prototyping, Building a Minimum Viable Product, Hypothesis Testing and MVP Validation, MVP Iteration-Importance of Build - Measure – Learn Approach	[6]
Business Plan, Financial Feasibility and Managing Growth Business Planning: Components of Business Plan- Sales Plan, People Plan and Financial Plan, Preparing a Business Plan. Financial Planning: Types of Costs, Preparing the Financial Plan Using Financial Template, Understanding Basics of Unit Economics and Analyzing Growth and the Financial Performance	[6]
Go To Market Strategies and Funding Introduction to Go to Market Strategies, Start-up Branding and Its Elements, Selecting the Right Channel, Creating Digital Presence, Building Customer Acquisition Strategy. Choosing a Form of Business Organization Specific to Your Venture, Identifying Sources of Funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options, Build an Investor Ready Pitch Deck.	[6]
Total Hours	**30**

Text Book(s):	
1.	Stephen Key, “One Simple Idea for Startups and Entrepreneurs: Live Your Dreams and Create Your Own Profitable Company” 1st Edition, Tata Mc Grawhill Company, New Delhi, 2013.
2.	Charles Bamford and Garry Bruton, “Entrepreneurship: The Art, Science, and Process for Success”, 2nd Edition, Tata Mc Grawhill Company, New Delhi, 2016.
Reference(s):	
1.	Philip Auerswald, “The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy”, Oxford University Press, 2012.
2.	Janet Kiholm Smith; Richard L. Smith Richard T. Bliss, “Entrepreneurial Finance: Strategy, Valuation and Deal Structure, Stanford Economics and Finance”, 2011.
3.	Edward D. Hess, “Growing an Entrepreneurial Business: Concepts and Cases”, Stanford Business Books, 2011.
4.	Ignite Program, Wadhwani Platform, Entrepreneurship, NPTEL online course By Prof. C Bhaktavatsala Rao IIT Madras

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Introduction to Entrepreneurship & Entrepreneur**	
1.1	Meaning and Concept of Entrepreneurship and the History of Entrepreneurship Development	1
1.2	The Entrepreneur: Meaning, the Skills Required to Be an Entrepreneur, the Entrepreneurial Decision Process	1
1.3	Myths of Entrepreneurship, How to Become a Successful Entrepreneur - Dr Romesh Wadhwani (Platform on Boarding)	1
1.4	Role Models, Mentors and Support System- Masterclass on My Story - Joshua Salins	1
1.5	Role of Entrepreneurship in Economic Development, Agencies in Entrepreneurship Management and Future of Entrepreneurship	1
1.6	Innovation and Creativity, Types of Innovations, Innovations in Current Scenario, Concepts of Entrepreneurial Thinking, General Enterprising Tendency Test	1
2.0	**Problem-Opportunity Identification, Customers Discovery and competitive advantage**	
2.1	Understanding the Problem and Opportunity, Define Problem Using Design Thinking Principles and Validate Problem. Case Study and Fireside Chat – Desi Hangover	1
2.2	Identifying a Problem for Practice Venture and Filling Problem Statement Canvas (Handout Week 1 - Class Activity)	1
2.3	Customer and Markets Discovery, Knowing Your Customer and Consumer, Customer Segmentation and Exploring Market Types and Estimating the Market Size. Case Study and Fireside Chat – Verloop	1
2.4	Creating Customer Personas & Market Estimation (Handout Week 2 - Class Activity)	1
2.5	Importance of Value Proposition, Introduce Value Proposition Canvas, Developing Problem-Solution Fit. Case Study and Fireside Chat – Honey Twigs	1
2.6	Competition Analysis, Blue Ocean Strategy, Competitive Positioning and Understanding Unique Selling Points. Case Study and Fireside Chat on Inzpira Fill Value Proposition Canvas (Handout Week 3 - Class Activity) and Competition Analysis Framework (Handout Week 5 - Class Activity) Briefing on Assignment 1 - Milestone 1	1
3.0	**Business model and Build your MVP**	
3.1	Introduction to Business Model and Types. Case Study and Fireside Chat – NUOS	1
3.2	Lean Approach, 9 Block Lean Canvas Model, Riskiest Assumptions to Business Models	1
3.3	Class Activity- Fill Lean Canvas for You Idea and Understand Revenue Model (Handout Week 6)	1
3.4	Prototyping, Meaning of MLP, Difference Between MLP and MVP, How to Build an MLP? Different Types MLP That You Can Build. Case Study and Fireside Chat – KNORISH	1
3.5	Hypothesis Testing and MVP Validation, MVP Iteration-Importance of Build - Measure – Learn Approach	1
3.6	Class Activity- Fill MVP Framework (Handout Week 7) and Learn Validation	1
4.0	**Business Plan, Financial feasibility and Manging growth**	
4.1	Business Planning: Components of Business Plan- Sales Plan, People Plan and Financial Plan, Preparing a Business Plan. Case Study and Fireside Chat – Bodh Gems	1
4.2	Financial Planning: Types of Costs, Preparing the Financial Plan Using Financial Template (Handout Week 9)	1
4.3	Class Activity - Starting Up Costs, COGS, Sales Plan and People Plan Template.	1
4.4	Class Activity - One Year P&L Projection, Breakeven Analysis, Five Year Projection	1
4.5	Understanding Basics of Unit Economics and Analyzing Growth and the Financial Performance	1
4.6	Class Activity - Financial Template - Unit Economics (Handout Week 12)	1
5.0	**Go To Market Strategies and Funding**	
5.1	Introduction to Go to Market Strategies, Start-up Branding and Its Elements, Selecting the Right Channel	1
5.2	Creating Digital Presence, Building Customer Acquisition Strategy.	1

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5.3	Class Activity: Handout Week 10 - Create Your GTM Strategy	1
5.4	Choosing a Form of Business Organization Specific to Your Venture	1
5.5	Identifying Sources of Funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options	1
5.6	Class Activity - Visit Relevant GOI Websites, Other Sites to Help Students Explore Funding Opportunities and Briefing on Final Submission of the Pitch Deck Build an Investor Ready Pitch Deck, What Should You Cover in Your Pitch Deck? Art of Pitching and Storytelling	1

Course Designer(s)

1. Dr.N.Tiruvenkadam - tiruvenkadam@ksrct.ac.in

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60 IT 5P1	Operating Systems and Open Source Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To understand the concepts of OS and Implement in C through Unix
- To design and implement complex data structures and functionality of simple tasks in an operating system.
- To choose the best CPU scheduling algorithm for a given problem instance.
- To identify the performance of various page replacement algorithms.
- To provide students with a theoretical and practical knowledge in open source and its applications.

Pre-requisites

- Basic knowledge of programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Implement the basic commands to implement shell programming	Apply
CO2	Implement the various system calls commands of UNIX	Apply
CO3	Design the scheduling process using FCFS and SJF scheduling	Analyse
CO4	Demonstrate Page replacement policies concept using FIFO method	Apply
CO5	Demonstrate the memory management algorithms	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO2	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	2	-	3	3	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S. Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT 5P1- Operating Systems and Open Source Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	0	0	4	60	2	60	40	100

List of Experiments:

1. Shell Programming
   - Command Syntax
   - Write Simple Functions
   - Basic Tests
2. Write Programs using the Following System Calls of UNIX Operating System:
   fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write Programs using the I/O System Calls of UNIX Operating System (open, read, write, etc)
4. Given the List of Processes, their CPU burst times and arrival times, display/print the Gantt Chart for FCFS and SJF. For each of the Scheduling Policies, Compute and Print the Average Waiting Time and Average Turnaround Time.
5. Implementation of FIFO Page Replacement Algorithms.
6. Implement the Producer – Consumer Problem using Semaphores.
7. Implement IPC using Shared Memory
8. Implementation of Best-fit, First-fit Algorithms for Memory Management.
9. Installation of Open Office, Mail Client & Web/Internet Browser and Configuration.
10. User Creation and Group Creation

Design Experiments:

Installation of Linux OS

Lab Manual

1.	"Operating Systems Lab Manual", Department of Information Technology, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. Mrs.V.P.Dhivya – dhivyavp@ksrct.ac.in

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60 IT 5P2	Computer Networks Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To acquire knowledge on various networking protocols
- To learn the socket programming for client-server communication
- To Analyse and implement flow control mechanisms
- To demonstrate the working of error control techniques
- To design unicast and multicast routing algorithms

Pre-requisites

- Basic knowledge of java programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Acquire hands on experience on various networking protocols	Apply
CO2	Implement socket programming for client-server communication	Apply
CO3	Analyse and implement flow control mechanisms	Analyse
CO4	Implement error detection and correction techniques	Apply
CO5	Implement unicast and multicast routing protocol	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO2	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	2	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	2	-	3	3	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity	Lab	
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT 5P2- Computer Networks Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	0	0	4	60	2	60	40	100

List of Experiments:

1. Study of Networking Commands and Network Configuration files
2. Write a Code to Simulating ARP /RARP Protocols *
3. Implementation of Socket Programming and Client – Server Model
4. Implement application using TCP / UDP sockets *
   i)Echo Client and Echo Server ii) Video Conferencing iii) File Transfer
5. Implementation of Stop and Wait Protocol
6. Implementation of Parity Checker
7. Study and Implementation of CRC Algorithm
8. Implementation of Error Correction using Hamming code
9. Simulation of Congestion Control Techniques *
10. Performance Evaluation of Unicast / Multicast Routing Protocol *

Design Experiments:

1. Setup a Network and Configure IP Addressing Subnetting Masking (Eg: CISCO Packet Tracer).
2. Build a Simple Network Topology to configure it for Static Routing Protocol using Packet Tracer.

Lab Manual

1.	"Computer Networks Lab Manual", Department of Information Technology, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

1. Mrs.S.Geetha – geethas@ksrct.ac.in

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60 CG 0P4	Career Skill Development IV	Category	L	T	P	Credit
		CG	0	0	2	1*

Objectives

- To help learners improve their vocabulary and enable them to use words appropriately in different academic and professional contexts.
- To help learners develop strategies that could be adopted while reading texts.
- To help learners acquire the ability to speak and write effectively in English in real life and career related situations.
- Improve listening, observational skills, and problem-solving capabilities
- Develop message generating and delivery skills

Pre-requisites

- Basic knowledge of Arithmetic and Logical Reasoning.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Compare and contrast products and ideas in technical texts.	Analyse
CO2	Identify cause and effects in events, industrial processes through technical texts	Analyse
CO3	Analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format.	Analyse
CO4	Report events and the processes of technical and industrial nature.	Apply
CO5	Articulate their opinions in a planned and logical manner, and draft effective résumés in context of job search.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	3	-	3	-	-	-	2	3	3	2	3	2
CO2	3	3	3	3	-	2	-	-	-	2	3	3	2	3	3
CO3	2	2	2	2	-	3	-	-	-	2	3	3	2	3	2
CO4	3	3	3	3	-	2	-	-	-	2	3	3	-	3	3
CO5	3	3	3	3	-	2	-	-	-	2	3	3	-	3	3
3 - Strong; 2 - Medium; 1 – Some															

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.TECH – Information Technology								
60 CG 0P4 - Career Skill Development IV								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	**0**	**0**	**2**	**30**	**1***	**100**	**00**	**100**

Verbal & Analytical Reasoning Seating Arrangements – Analytical Reasoning (PUZZELS) – Machine Input and Output - Coded Inequality – Eligibility Test	[6]
Quantitative Aptitude - Part – 4 Permutation and Combination - Probability - Quadratic equation - Geometry – Clock – Calendar – Logarithmic	[6]
Non-Verbal Reasoning* Series Completion of Figures – Classification – Courting of Figure – Figure matrix – Embedded Figure – Complete Figure – Paper Cutting and Folding – Mirror Images and Water Images	[6]
Quantitative Aptitude - Part – 5 Mensuration of Area, Volume and Surface Area in 2D and 3D Shapes – 2D Shapes – Square, Rectangle, Triangle, Circle, etc. - 3D Shapes – Cube, Cuboid, Sphere, Cone, etc.	[6]
Data Interpretation and Analysis* Data interpretation Based on text - Data interpretation Based on Tabulation, Pie chart, Bar graph and Line graph – Venn Diagram - Data sufficiency.	[6]
Total Hours:	**30**

Reference(s):

1.	Aggarwal, R.S. 'A Modern Approach to Verbal and Non-verbal Reasoning', Revised Edition 2008,Reprint 2009,S.Chand & Co Ltd., New Delhi.
2.	Abhijit Guha, 'Quantitative Aptitude', McGraw Hill Education, 6th edition, 2016
3.	Dinesh Khattar, 'Quantitative Aptitude For Competitive Examinations', Pearson Education (2020)
4.	Anne Thomson, 'Critical Reasoning: A Practical Introduction' Lexicon Books, 3rd edition, 2022. Warszaw

*SDG 4 – Quality in Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Verbal & Analytical Reasoning**	
1.1	Seating Arrangements	1
1.2	Analytical Reasoning (Puzzels)	1
1.3	Machine Input and Output	1
1.4	Coded Inequality	1
1.5	Eligibility Test	1
2.0	**Quantitative Aptitude - Part – 4**	
2.1	Permutation and Combination	1
2.2	Probability	1
2.3	Quadratic Equation - Geometry	1
2.4	Clock – Calendar	1
2.5	Logarithmic	1
3.0	**Non-Verbal Reasoning**	
3.1	Series Completion of Figures – Classification	1
3.2	Courting of figure – Figure matrix	1
3.3	Embedded Figure – Complete Figure	1
3.4	Paper Cutting and Folding	1
3.5	Mirror Images and Water Images	1
4.0	**Quantitative Aptitude - Part – 5**	
4.1	Mensuration of Area, Volume	1
4.2	Mensuration of Volume	1
4.3	Surface Area in 2D and 3D Shapes	1
4.4	2D Shapes – Square, Rectangle, Triangle, Circle, etc.	1
4.5	3D Shapes – Cube, Cuboid , Sphere , Cone , etc.	1
5.0	**Data Interpretation and Analysis**	
5.1	Data Interpretation Based on Text	1
5.2	Data Interpretation Based on Tabulation, Pie chart	1
5.3	Bar graph, Line graph	1
5.4	Venn Diagram	1
5.5	Data Sufficiency	1
	Total	30

Course Designer(s)

1. MR.R. Poovarasan - poovarasan@ksrct.ac.in

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K.S.RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2024 – 2025)

SIXTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment *	End Semester Exam **	Max. Marks		
THEORY								
1.	60 HS 002	Engineering Economics and Financial Accounting	2	40	60	100	45	100
2.	60 IT 601	Data Mining and Analytics	2	40	60	100	45	100
3.	61 IT 602	Full Stack Development	2	40	60	100	45	100
4.	60 IT 603	Machine Learning	2	40	60	100	45	100
5.	60 IT E2*	Professional Elective – II	2	50	50	100	45	100
6.	60 OE L0*	Open Elective – III	2	40	60	100	45	100
PRACTICALS								
7	61 IT 6P1	Data Mining and Analytics Laboratory	2	60	40	100	45	100
8.	60 IT 6P2	Full Stack Development Laboratory	2	60	40	100	45	100
9.	60 IT 6P3	Mini Project	2	100	-	100	-	-
10.	60 CG 0P5	Comprehension Test	-	100	-	100	-	100
11.	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

Rev. No.1/w.e.f. 13.06.2026
Approved Passed in BoS Meeting held on 06.05.2026
in Academic Council Meeting held on 13.06.2026

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Department of Information Technology,
K.S.Rangasamy College of Technology,
Tiruchengode - 637 215

60 HS 002	Engineering Economics and Financial Accounting	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To know about the economic principles underlying demand, supply, and market structure
- To understand the concept related to types of business organization and types of banking
- To know about concepts in financial accounting and capital budgeting
- To understand the different methods of pricing and appraisal of projects
- To know the application of break-even analysis in engineering projects

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Summarize the basic concepts of economics, demand, supply, and market structure	Understand
CO2	Interpret the forms of business organization and functions of commercial and central bank	Understand
CO3	Examine the basis of financial accounting and capital budgeting techniques	Analyse
CO4	Demonstrate the different types of pricing strategies and comprehensive project feasibility in diverse business	Apply
CO5	Demonstrate the break-even analysis in engineering projects and business	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	2	3	-	3	-	-	-	3	2	3	3	3
CO2	-	-	-	-	-	2	2	-	-	-	3	3	-	3	-
CO3	-	-	2	3	-	-	-	-	-	-	3	-	2	2	-
CO4	2	-	-	3	-	2	-	-	-	-	-	3	3	3	2
CO5	3	3	3	3	-	-	2	2	-	-	2	2	3	2	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	25	35
Understand	30	25	35
Apply	-	10	20
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
Common to CIVIL, EEE, ECE, CSE, IT, AI&DS, CSE(AIML), EE(VLSI D&T), BT, FT								
60 HS 002 – Engineering Economics and Financial Accounting								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Basic Economics Definition of Economics – Nature and Scope of Economics, Basic Concepts of Economics, Factors of Production - Definition of Demand – Law of Demand, Exception to Law of Demand, Factors Affecting Demand, Elasticity of Demand, Demand Forecasting – Definition of Supply – Factors Affecting Supply, Elasticity of Supply – Market Structure – Perfect Competition, Imperfect Competition – Monopoly, Duopoly, Oligopoly, and Bilateral Monopoly.	[9]
Organization and Business Financing* Forms of Business – Sole Proprietorship, Partnership, Joint Stock Company, Cooperative Organization, State Enterprise - Mixed Economy - Money and Banking – Kinds of Banking, Functions of Commercial Banks and Central Bank – Definition of Monetary Policy and its Types – Types of financing - Short Term Borrowing, Long Term Borrowing - Internal Generation of Funds – External Commercial Borrowings.	[9]
Financial Accounting and Capital Budgeting The Balance Sheet and Related Concepts – The Profit and Loss Statement and Related Concepts – Financial Ratio Analysis – Definition of Working Capital – Types, Factors – Definition of Capital Budgeting - Techniques – Average Rate of Return, Payback Period, Net Present Value, Profitability Index Method and Internal Rate of Return.	[9]
Cost Analysis Types of Costing – Traditional Costing Approach - Activity Based Costing - Fixed Cost – Variable Cost – Marginal Cost – Cost Output Relationship in the Short Run and in Long Run – Pricing Practice – Full Cost Pricing – Marginal Cost Pricing – Going Rate Pricing – Bid Pricing – Pricing for a Rate of Return – Project Appraisal - Appraisal process, - Cost Benefit Analysis – Feasibility Reports — Technical Feasibility, Economic Feasibility, Financial Feasibility, Managerial Feasibility, Operational Feasibility.	[9]
Break Even Analysis Basic Assumptions –Break-Even Chart – Profit Zone in Break-Even Chart, Loss Zone in Break-Even Chart, Angle of Incidence – Managerial Uses of Break-Even Analysis, Applications of Break-Even Analysis in Engineering Projects.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Khan M.Y., Jain P.K., “Financial Management”, 8rd Edition, McGraw Hill Education, 2018.
2.	Maheshwari K.L., Varshney R.L., “Managerial economics”, 22nd Edition, S Chand and Co., New Delhi, 2018.
Reference(s):	
1.	Samuelson P.A., “Economics - An Introductory”, 16th Edition, New Age Publications, New Delhi, 2019.
2.	Barthwal R.R., “Industrial Economics - An Introductory”, 4th Edition, New Age Publications, New Delhi, 2021.+
3.	Bhattacharyya S. K., John Deardon, “Accounting for Management Text and Cases”, 3rd Edition, S Chand Publication, 2018.

*SDG 9 – Increase Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Basic Economics**	
1.1	Definition of Economics – Nature and Scope of Economics	1
1.2	Basic Concepts of Economics, Factors of Production	1
1.3	Definition of Demand – Law of Demand	1
1.4	Exception to Law of Demand	1
1.5	Factors Affecting Demand, Elasticity of Demand	1
1.6	Demand Forecasting	1
1.7	Definition of Supply – Factors Affecting Supply, Elasticity of Supply	1
1.8	Market Structure – Perfect Competition, Imperfect Competition	1
1.9	Monopoly, Duopoly, Oligopoly, and Bilateral Monopoly	1
2.0	**Organization and Business Financing**	
2.1	Forms of Business – Sole Proprietorship, Partnership	1
2.2	Joint Stock Company, Cooperative Organization, State Enterprise	1
2.3	Mixed Economy - Money and Banking	1
2.4	Kinds of Banking	1
2.5	Functions of Commercial Banks and Central Bank	1
2.6	Definition of Monetary Policy and Its Types	1
2.7	Types of Financing	1
2.8	Short Term Borrowing, Long Term Borrowing	1
2.9	Internal Generation of Funds, External Commercial Borrowings	1
3.0	**Financial Accounting and Capital Budgeting**	
3.1	The Balance Sheet and Related Concepts	1
3.2	The Profit and Loss Statement and Related Concepts	1
3.3	Financial Ratio Analysis	2
3.4	Definition of Working Capital – Types, Factors	2
3.5	Definition of Capital Budgeting - Techniques	1
3.6	Average Rate of Return, Payback Period	1
3.7	Net Present Value, Profitability Index Method and Internal Rate of Return	1
4.0	**Cost Analysis**	
4.1	Types of Costing - Traditional Costing Approach - Activity Based Costing	1
4.2	Fixed Cost – Variable Cost – Marginal Cost	1
4.3	Cost Output Relationship in the Short Run and in Long Run	1
4.4	Pricing Practice – Full Cost Pricing	1
4.5	Marginal Cost Pricing, Going Rate Pricing	1
4.6	Bid Pricing, Pricing for a Rate of Return	1
4.7	Project Appraisal - Appraisal Process - Cost Benefit Analysis	1
4.8	Feasibility Reports - Technical Feasibility, Economic Feasibility	1
4.9	Financial Feasibility, Managerial Feasibility, Operational Feasibility	1
5.0	**Break Even Analysis**	
5.1	Basic Assumptions – Break-Even Chart	2
5.2	Profit Zone in Break-Even Chart, Loss Zone in Break-Even Chart	2
5.3	Angle of Incidence	1
5.4	Managerial Uses of Break-Even Analysis	2
5.5	Applications of Break-Even Analysis in Engineering Projects	2

Course Designer(s)

1. Mr.V.S.Vijayachander - vijayachander@ksrct.ac.in
2. Dr.E.kalaivani - kalaivanie@ksrct.ac.in

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60 IT 601	Data Mining and Analytics	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the concepts of Data Mining.
- To familiarize with association rule mining.
- To familiarize various classification algorithms.
- To understand the concepts of Cluster analysis.
- To implement the Data mining concepts with various domains.

Pre-requisites

- Basic knowledge of Software Engineering, Software Automation Tools.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Gain knowledge about the concepts of Data Mining	Remember
CO2	Understand and Apply Association rule mining techniques	Apply
CO3	Understand and Apply various Classification algorithms	Apply
CO4	Gain knowledge on the concepts of Cluster Analysis	Apply
CO5	Understand the importance of applying Data mining concepts in different domains	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	2	2	2	-	-	-	1	1	1	3	2	-
CO2	3	2	3	3	1	2	-	-	-	1	1	1	3	2	-
CO3	3	2	1	1	3	2	-	-	-	1	1	1	3	2	-
CO4	3	3	2	3	1	2	-	-	-	1	1	1	3	2	-
CO5	3	3	2	3	1	2	-	-	-	1	1	1	3	2	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	20	20	50
Apply	30	30	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT 601– Data Mining and Analytics								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction Introduction to Data Mining - Kinds of Data - Data mining Functionalities - Interesting Patterns - Task Primitives- Issues in Data Mining- Data Preprocessing.	[9]
Association Rules* Basic Concepts - Frequent Item Set Mining Methods - Association Rules - Correlation Analysis.	[9]
Classification and Prediction* Issues Regarding Classification and Prediction- Decision Tree Induction Classification- Bayesian and Rule Based Classification- Support Vector Machine - Prediction.	[9]
Cluster analysis* What is Cluster Analysis -Types of Data in Cluster Analysis - Categorization of Clustering Methods -Hierarchical Methods.	[9]
Trends in Data Mining** Applications of Data Mining-Machine Learning - Big Data - Cloud Computing.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Jiawei Han and Micheline Kamber,“Data Mining – Concepts and Techniques”, Second Edition, Morgan Kaufmann Publishers, 2006.
Reference(s):	
1.	Dunham M. H., “Data Mining: Introductory and Advanced Topics”, Pearson Education. 2001.
2.	Hand D., Mannila H and Smyth P., “Principles of Data Mining”, Prentice Hall. 2001.
3.	Witten I H and Frank E., “Data Mining: Practical Machine Learning Tools and Techniques”, Morgan Kaufmann. 2000.
4.	Nathan Marz, James Warren, “Big Data-Principles and best practices of scalable real-time data systems”, DreamTech Press, 2015
5.	Arshdeep Bahga, Vijay Madisetti, "Cloud Computing: A Hands-On Approach", University Press, 2016

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Course Contents and Lecture Schedule		
S.No.	**Topic**	**No. of Hours**
1.0	**Introduction**	
1.1	Introduction to Data Mining	1
1.2	Kinds of Data	1
1.3	Data Mining Functionalities	1
1.4	Interesting Patterns	1
1.5	Task Primitives	2
1.6	Issues in Data Mining	1
1.7	Data Preprocessing	2
2.0	**Association Rules**	
2.1	Basic Concepts	1
2.2	Frequent Item Set Mining Methods	3
2.3	Association Rules	3
2.4	Correlation Analysis	2
3.0	**Classification and Prediction**	
3.1	Issues Regarding Classification and Prediction	1
3.2	Decision Tree Induction Classification	2
3.3	Bayesian and Rule Based Classification	2
3.4	Support Vector Machine	2
3.5	Prediction	2
4.0	**Cluster analysis**	
4.1	What is Cluster Analysis	2
4.2	Types of Data in Cluster Analysis	2
4.3	Categorization of Clustering Methods	3
4.4	Hierarchical Methods	2
5.0	**Trends in Data Mining**	
5.1	Applications of Data Mining	2
5.2	Machine Learning	3
5.3	Big Data	2
5.4	Cloud Computing	2
	Total	45

Course Designers

1.Mrs.K.Mahalakshmi – mahalakshmik@ksrct.ac.in

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61 IT 602	Full Stack Development	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the fundamentals of MERN stack architecture and JavaScript programming.
- To develop interactive and responsive user interfaces using React JS.
- To build server-side applications and RESTful APIs using Node.js and Express.js.
- To design and manage NoSQL databases using MongoDB and Mongoose.
- To Integrate MERN stack components to develop, secure, and deploy full-stack web applications

Pre-requisites

- Basic knowledge of programming concepts and problem-solving.
- Familiarity with HTML, CSS, and JavaScript fundamentals.
- Basic understanding of database concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand modern web application architecture and JavaScript programming concepts.	Understand
CO2	Develop interactive and responsive user interfaces using React.	Apply
CO3	Build scalable server-side applications and REST APIs using Node.js and Express.js	Apply
CO4	Design and manage database systems using MongoDB and Mongoose.	Analyse
CO5	Develop, deploy and maintain complete MERN stack applications.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	2	1	1	1	1	1	-
CO2	3	3	3	3	2	1	-	-	2	-	2	3	2	2	1
CO3	3	3	2	2	2	2	-	-	2	2	2	3	2	2	1
CO4	3	3	2	2	2	1	-	-	1	1	2	2	2	2	1
CO5	3	3	3	3	3	1	-	-	-	-	2	2	2	2	1
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	6	10
Understand	10	4	10
Apply	40	40	70
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022

B. Tech – Information Technology

61 IT 602– Full Stack Development

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Fundamentals of Web Development and JavaScript Introduction to Full Stack Development – Evolution of Web Technologies – Client-Server Architecture – Frontend, Backend and Database Concepts – Web Browsers and Web Servers – Introduction to MERN Stack – Setting up Development Environment –JavaScript Fundamentals – Variables, Data Types, Operators – Control Statements – Functions – Arrays and Objects – ES6 Features – Arrow Functions – Modules – Asynchronous Programming – Promises and Async/Await.	[9]
Frontend Development using React JS * Introduction to React JS – React Environment Setup – Components and Component Lifecycle – Functional Components – JSX – Props and State – Event Handling – Conditional Rendering – Lists and Keys – Forms and Form Validation – React Hooks (useState, useEffect, useContext) – React Router – Styling React Applications – Bootstrap and Material UI Integration – API Integration using Axios and Fetch API – State Management Concepts.	[9]
Backend Development using Node.js and Express.js Introduction to Node.js – Node Package Manager (NPM) – Modules and File System – Event Loop Architecture – Express.js Framework – Routing – Middleware – Request and Response Handling – RESTful API Design – CRUD Operations – Error Handling – Authentication and Authorization Concepts – JWT Authentication – Password Encryption using bcrypt – Environment Variables – API Testing using Postman.	[9]
MongoDB Database Management Introduction to NoSQL Databases – MongoDB Architecture – Installation and Configuration – Database and Collection Creation – CRUD Operations – Query Operators – Projection and Sorting – Aggregation Framework – Indexing – Schema Design – Validation – MongoDB Atlas – Mongoose ODM – Data Modeling – Connecting MongoDB with Express Applications.	[9]
MERN Stack Integration and Real-Time Applications ** Integration of React, Express, Node and MongoDB – Full Stack Application Architecture – Authentication and Authorization in MERN Applications – File Upload and Storage – Session Management – Deployment of MERN Applications – Case Study of MERN Applications – Mini Project Development and Deployment.	[9]
Total Hours:	**45**

Text Book(s):

1. Vasan Subramanian, Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress, 2019.
2. Shama Hoque, Full Stack React Projects: Learn MERN Stack Development by Building Modern Web Applications, 2nd Edition, Packt Publishing, 2023.

Reference(s):

1. Alex Banks and Eve Porcello, Learning React: Modern Patterns for Developing React Apps, 3rd Edition, O'Reilly Media, 2024.
2. Ethan Brown, Web Development with Node and Express: Leveraging JavaScript to Build Web Applications, 3rd Edition, O'Reilly Media, 2024.
3. Mern Stack Development Team, MERN Quick Start Guide: Build Web Applications with MongoDB, Express, React, and Node, Packt Publishing, Latest Edition.

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Fundamentals of MERN Stack Development**	
1.1	Introduction to Full Stack Development and MERN Stack	1
1.2	Client-Server Architecture and Web Application Framework	1
1.3	Development Environment Setup (VS Code, Node.js, npm)	1
1.4	JavaScript Fundamentals (Variables, Data Types, Operators)	1
1.5	Functions, Arrays, Objects	1
1.6	ES6 Features	1
1.7	DOM Manipulation and Event Handling	1
1.8	Asynchronous JavaScript (Callbacks, Promises)	1
1.9	Async/Await and Introduction to Modern Web Applications	1
2.0	**React JS Frontend Development**	
2.1	Introduction to React JS and React Environment Setup	1
2.2	JSX and React Components	1
2.3	Props and State Management	1
2.4	Event Handling and Conditional Rendering	1
2.5	Forms and Form Validation	1
2.6	React Hooks (useState, useEffect)	1
2.7	React Router and Navigation	1
2.8	API Integration using Axios and Fetch API	1
2.9	Styling with Bootstrap/Material UI and Mini Application	1
3.0	**Node.js and Express.js Backend Development**	
3.1	Introduction to Node.js and npm	1
3.2	Node.js Modules and File System	1
3.3	Event Loop and Asynchronous Programming	1
3.4	Express.js Framework and Routing	1
3.5	Middleware and Request-Response Handling	1
3.6	REST API Development	1
3.7	CRUD Operations using Express.js	1
3.8	Authentication using JWT and bcrypt	1
3.9	API Testing using Postman	1
4.0	**MongoDB Database Management**	
4.1	Introduction to NoSQL and MongoDB	1
4.2	Database and Collection Creation	1
4.3	MongoDB CRUD Operations	1
4.4	Query Operators and Projection	1
4.5	Aggregation Framework	1
4.6	Indexing and Performance Optimization	1
4.7	Schema Design and Validation	1
4.8	MongoDB Atlas and Cloud Database	1
4.9	Mongoose ODM and Database Connectivity	1
5.0	**MERN Stack Integration and Deployment**	
5.1	MERN Architecture and Project Structure	1

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5.2	Connecting React with Express APIs	2
5.3	Connecting Express with MongoDB using Mongoose	2
5.4	Authentication and Authorization in MERN Applications	1
5.5	Deployment using Vercel, Render and MongoDB Atlas	2
5.6	Case Study on Real Time Applications (Java, MongoDB, React JS, Spring Boot with Microservices)	1

Course Designer(s)

1. Mr.D.Pradeep Kanna – pradeepkannad@ksrct.ac.in

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60 IT 603	Machine Learning	Category	L	T	P	Credit
		PC	3	1	0	4

Objectives

- To understand the need for machine learning for solving problem.
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning.
- To understand the machine learning theory and implement linear and non-linear learning models.
- To implement distance-based clustering techniques, build tree and rule based models.
- To apply reinforcement learning techniques for solving real-time applications.

Pre-requisites

- Basic knowledge of Mathematics and Programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Distinguish between, supervised, unsupervised and semi -supervised learning.	Remember
CO2	Apply the apt linear model for any given problem.	Understand
CO3	Suggest supervised, unsupervised or semi-supervised learning algorithms for assessing the distance-based analysis.	Analyse
CO4	Design ensemble model to improve accuracy rate for real world datasets.	Analyse
CO5	Apply reinforcement learning strategy for real-time applications.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	10	24
Understand	30	10	56
Apply	-	20	10
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology, Autonomous 2022								
60 IT 603- Machine Learning								
Information Technology								
Semester	**Hours/Week**			**Total hrs**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VI	**3**	**1**	**0**	**60**	**4**	**40**	**60**	**100**

Foundations of Learning Components of Learning – Learning Models – Geometric Models – Probabilistic Models – Logic Models – Grouping and Grading – Learning Versus Design – Types of Learning – Supervised – Unsupervised – Reinforcement – Theory of Learning – Feasibility of Learning – Error and Noise – Training Versus Testing – Theory of Generalization – Generalization Bound – Approximation Generalization Tradeoff – Bias and Variance.	[9]
Linear Models Linear Classification – Univariate Linear Regression – Multivariate Linear Regression – Logistic Regression – Perceptrons – Multilayer Neural Networks – Learning Neural Networks Structures – Support Vector Machines – Generalization and Overfitting – Regularization – Validation.	[9]
Distance-Based Models* Nearest Neighbor Models – K-Means – Clustering Around Medoids – Silhouttes – Hierarchical Clustering – K-D Trees – Locality Sensitive Hashing – Non-Parametric Regression	[9]
Ensemble Learning Ensemble Learning Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: Random Forest Trees, Boosting : Adaboost, Stacking.	[9]
Reinforcement Learning Passive Reinforcement Learning – Direct Utility Estimation – Adaptive Dynamic Programming – Temporal-Difference Learning – Active Reinforcement Learning – Exploration – Learning an Action Utility Function – Generalization in Reinforcement Learning – Policy Search – Applications in Game Playing – Applications in Robot Control	[9]
Total Hours: 45 + 15(Tutorial)	**60**

Text Book(s):

1.	Peter Flach, “Machine Learning: The Art and science of Algorithms that Make Sense of Data”, Cambridge University Press, 2012.
2.	Andreas Muller,Sarah Guido, “Introduction to Machine Learning with Python : A Guide for Data Scientists”,4th Edition,O’Reilly, 2018.

Reference(s):

1.	Mitchell T. M., “Machine Learning”, McGraw Hill, 1997.
2.	EthemAlpaydin, “Introduction to Machine Learning”, 3rd Edition, MIT Press, 2014.
3.	Barber D., “Bayesian Reasoning and Machine Learning”, Cambridge University Press, 2012.

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Course Contents and Lecture Schedule

S.No.	Topic	No.of Hours
1.0	**Foundation of Learning**	
1.1	Component of Learning – Learning Models	1
1.2	Geometric Models – Probabilistic Models	1
1.3	Logic Models – Grouping & Grading	1
1.4	Learning Versus Design – Types of Learning	1
1.5	Supervised – Unsupervised – Reinforcement	1
1.6	Theory of Learning – Feasibility of Learning	1
1.7	Error & Noise – Training versus Testing	1
1.8	Theory of Generalization – Generalization Bound	1
1.9	Approximation Generalization – Bias & Variance	1
2.0	**Linear Models**	
2.1	Linear Classification – Univariate Linear Regression	1
2.2	Multivariate Linear Regression – Logistic Regression	1
2.3	Perceptrons – Multilayer Neural Networks	1
2.4	Learning Neural Network Structures	1
2.5	Support Vector Machines	1
2.6	Generalization	1
2.7	Overfitting	1
2.8	Regularization	1
2.9	Validation	1
3.0	**Distance Based Models**	
3.1	Nearest Neighbor Models	1
3.2	K – Means	1
3.3	Clustering Around Medoids	1
3.4	Silhouettes	1
3.5	Hierarchical Clustering	1
3.6	K – D Trees	1
3.7	Locality Sensitive Hashing	1
3.8	Non-Parametric Regression	1
3.9	Demo of Non-Parametric Regression	1
4.0	**Ensemble Learning**	
4.1	Ensemble Learning	1
4.2	Ensemble Learning Model Combination Schema	1
4.3	Voting	1
4.4	Error Correcting Output Codes	1
4.5	Bagging	1
4.6	Random Forest Trees	1
4.7	Boosting	1
4.8	Adaboost	1
4.9	Stacking	1
5.0	**Reinforcement Learning**	
5.1	Passive Reinforcement Learning	1
5.2	Direct Utility Estimation – Adaptive Dynamic Programming	1
5.3	Temporal Difference Learning	1

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5.4	Active Reinforcement Learning – Exploration	1
5.5	Learning an Action Utility Function	1
5.6	Generalization in Reinforcement Learning Search Policy	1
5.7	Policy Search	1
5.8	Application in Game Planning	1
5.9	Application in Robot Control	1

Course Designer(s)

1 K.Senthilkumar - senthilkumark@ksrct.ac.in

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60 MY 004	Disaster Management	Category	L	T	P	Credit
		MC	2	0	0	0

Objectives

- To understand the fundamental concepts of disasters, including hazard, vulnerability, risk, and capacity
- To recognise the different types of natural, biological, technological, and man-made disasters
- To explain the disaster management cycle and apply appropriate strategies for prevention, mitigation, preparedness, response, recovery, and rehabilitation.
- To know the disaster management frameworks and practices in India
- To recognise science, technology, and engineering approaches for disaster risk reduction

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand basic terms related to disasters, hazards, vulnerability, risk, and disaster management.	Understand
CO2	Recognize different types of natural, biological, technological, and man-made disasters.	Understand
CO3	Know the main stages of the disaster management cycle and the roles of people and authorities during disasters.	Understand
CO4	Summarize the disaster management systems, laws, and institutions in India.	Understand
CO5	Recognize the role of safety practices, science, and technology in reducing disaster risks.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
CO2	1	1	-	-	-	1	1	-	-	-	-	-	-	-	-
CO3	1	1	-	-	-	2	1	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-
CO5	-	-	-	-	1	2	2	-	-	-	-	-	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	-
Understand	40	40	-
Apply	-	-	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	-

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 MY 004 - Disaster Management								
Common to All Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	2	0	0	30	0	100	-	-

Understanding Disasters Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management	[6]
Types, Trends, Causes, Consequences and Control of Disasters Geological Disasters (earthquakes, landslides, tsunami, mining) Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire) Technological Disasters (chemical, industrial, radiological, nuclear) and Man- made Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters	[6]
Disaster Management Cycle and Framework Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue - Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action	[6]
Disaster Management in India Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter- Governmental Agencies	[6]
Applications of Science and Technology for Disaster Management Geo-informatics in Disaster Management (RS, GIS, GPS and RS) Disaster Communication System (Early Warning and Its Dissemination) Land Use Planning and Development Regulations Disaster Safe Designs and Constructions Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India.	[6]
Total Hours:	**30**

Text Book(s):	
1.	Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
2.	Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
Reference(s):	
1.	An overview on natural & man-made disasters and their reduction, R K Bhandani, CSIR, New Delhi
2.	World Disasters Report, 2009. International Federation of Red Cross and Red Crescent, Switzerland
3.	Encyclopaedia of disaster management, Vol I, II and IIIL Disaster management policy and administration, S L Goyal, Deep & Deep, New Delhi, 2006
4.	Disasters in India Studies of grim reality, Anu Kapur & others, 2005, 283 pages, Rawat Publishers, Jaipur

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61 IT 6P1	Data Mining and Analytics Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To get practical exposure on implementation of well-known data mining Experiments.
- To get exposure to real life data sets for analysis and prediction.
- To use the principle algorithms and techniques in data mining, such as clustering, association mining, classification and prediction.
- To develop skills and apply data mining tools for solving practical problems.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Use different features of WEKA tool.	Apply
CO2	Preprocess the data for mining.	Apply
CO3	Determine association rules	Apply
CO4	Model various classifiers.	Apply
CO5	Examine clusters from the available data.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3	2	3	-	-	-	2	-	-	2	3	3	2
CO2	2	3	3	2	3	-	-	-	2	-	-	2	3	3	2
CO3	2	2	3	2	3	-	-	-	2	-	-	2	3	3	2
CO4	3	2	3	2	2	-	-	-	2	-	-	2	3	3	2
CO5	3	3	2	2	3	-	-	-	2	-	-	2	3	3	2
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
61 IT 6P1 – Data Mining and Analytics Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100

List of Experiments:

1. Basics of WEKA Tool
   a. Investigate the Application Interfaces. b. Explore the Default Datasets.
2. Pre-Process a Given Dataset Based on the Following:
   a. Attribute Selection b. Handling Missing Values
3. Pre-Process a Given Dataset Based on the Following: a. Discretization b. Eliminating Outliers
4. Create a Dataset in ARFF for any Given Dataset and Perform Market-Basket Analysis.
5. Generate Association Rules using the Apriori Algorithm.
6. Generate Association Rules using the FP-Growth Algorithm.
7. Implement Decision Tree using ID3 Algorithm.
8. Demonstrate Classification Process on a Given Dataset Using Naïve Bayesian Classifier.
9. Demonstrate Classification Process on a Given Dataset Using Rule Based Classifier.
10. Demonstrate Classification Process on a Given Dataset Using Nearest Neighbor Classifier.
11. Cluster the Given Dataset by Using the K-Means Algorithm and Visualize the Cluster Mean Values and Standard Deviation of Dataset Attributes.
12. Implementation of Supervised and Unsupervised learning algorithms using MATLAB

Design Experiments:

1. How do the Functionalities of the Explorer, Experimenter, Knowledge Flow and Simple CLI Interfaces differ in WEKA?
2. How does the Depth of the Decision Tree Affect the Accuracy and Interpretability of the ID3 Algorithm?

Lab Manual

1.	"Data Mining and Analytics Laboratory", Department of Information Technology, KSRCT.

*SDG 4 – Quality Education.

Course Designer(s)

1. Mrs.K.Mahalakshmi- mahalakshmik@ksrct.ac.in

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60 IT 6P2	Full Stack Development Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To develop full stack applications with clear understanding of user interface, business logic and data storage.
- To design and develop user interface screens for a given scenario.
- To develop the functionalities as web components as per the requirements.
- To implement the database according to the functional requirements.
- To integrate the user interface with the functionalities and data storage.

Pre-requisites

- Basic knowledge of any programming language with ability to solve logical problems.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Design full stack applications with clear understanding of user interface, business logic and data storage.	Apply
CO2	Design and develop user interface screens.	Apply
CO3	Implement the functional requirements using appropriate tool.	Analyse
CO4	Design and develop database based on the requirements.	Analyse
CO5	Integrate all the necessary components of the application	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	1	3	1	1	1	2	1	1	1	2	2	1
CO2	3	3	3	1	3	1	1	1	2	1	1	1	2	2	1
CO3	3	3	3	3	3	1	1	1	2	1	1	1	2	2	1
CO4	3	3	3	3	3	2	1	1	1	1	2	1	1	2	1
CO5	3	3	3	2	3	1	1	1	1	1	1	1	2	2	1
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K. S. Rangasamy College of Technology – Autonomous R2022								
Common to CSE & IT								
60 IT 6P2 – Full Stack Development Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100

List of Experiments:

1. Java Programs, CI/CD
2. Java Exception Handling
3. Java with JDBC and Drivers and Connections
4. Java Servlets
5. Spring Boot
6. Rest API
7. Spring Boot Database
8. Data JPA
9. Microservices*
10. MongoDB
11. Web Application using React JS

Design Experiments:

1. Mini project: Develop a Realtime application using the Concepts of Java, Spring Boot, Microservices, React JS along with JDBC.

Lab Manual

1.	"**Full Stack Development Lab Manual"**, Department of Information Technology, KSRCT.

*SDG 9 – Industry Innovation and Infrastructure

Course Designer(s)

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K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
60 IT 6P3 – Mini Project								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	0	0	2	30	1*	100	00	100

List of Experiments:

1. Three reviews have to be conducted by the committee of minimum of three members one of which should be guide*
2. Problem should be Identified and Selected *
3. Students have to collect about 20 papers related to their work *
4. Application can be developed *
5. Reports has to be Prepared by the Students as per the format in Annexure-1 and suggested for various conference Publication*
6. Internal evaluation has to be done for 100 Marks

*SDG 4 – Quality Education

Course Designer(s)

1. Dr.K.Sakthivel – sakthivelk@ksrct.ac.in

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60 CG 0P5	Comprehension Test	Category	L	T	P	Credit
		CG	0	0	2	1

Objectives

- To To evaluate the knowledge gained in core courses relevant to the programme of study.
- To assess the technical skill in solving complex engineering problems.

Pre-requisites

- Fundamental knowledge in all core subjects.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Infer knowledge in their respective programme domain.	Apply
CO2	Attend interviews for career progression	Apply
CO3	Exhibit professional standards to solve engineering problems	Apply
CO4	Promote holistic approach to problem solving	Apply
CO5	Examine the competency of graduates in specific programme domain	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	-	-	-	-	1	2	2	3	3	3	2
CO2	3	3	2	2	-	-	-	-	1	2	2	3	3	3	2
CO3	3	3	2	2	-	-	-	-	1	2	2	3	3	3	2
CO4	3	3	2	2	-	-	-	-	1	2	2	3	3	3	2
CO5	3	3	2	2	-	-	-	-	1	2	2	3	3	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

The overall knowledge of the candidate in various courses he/she studied shall be evaluatedwith multiple choice questions.

*SDG:4- Quality Education

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K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2025 - 2026)

SEVENTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment*	End Semester Exam **	Max. Marks		
THEORY								
1.	60 IT 701	Mobile Communication	2	40	60	100	45	100
2.	60 IT 702	Cryptography and Network Security	2	40	60	100	45	100
3.	60 IT 703	Cloud Computing	2	40	60	100	45	100
4.	60 IT 705	Software Testing	2	40	60	100	45	100
5.	60 IT E3*	Professional Elective III	2	40	60	100	45	100
6.	60 IT E4*	Professional Elective IV	2	40	60	100	45	100
7.	60 AC 001	Research Skill Development	-	100	-	100	-	100
8.	60 AB 00*	NCC/NSS/NSO/YRC/RRC/Fine Arts*	2	50	50	100	45	100
THEORY CUM PRACTICAL								
9.	60 IT 704	Computer Graphics and Virtual Reality	2	50	50	100	45	100
PRACTICALS								
10.	60 IT 7P1	Cloud Computing Laboratory	2	60	40	100	45	100
11.	60 IT 7P2	Project Work Phase - I	2	100	-	100	-	100
12.	60 CG 0P6	Internship	2	100	-	100	-	-

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination, 50 marks for theory cum practical End Semester Examination and 40 marks for practical End Semester Examination.

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60 IT 701	Mobile Communication	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To learn the basics of wireless technologies supporting voice and data communication.
- To recognize various Cellular and Satellite Networks.
- To study the operation of wireless LAN, Wireless MAN and its standards.
- To familiar with the Ad-Hoc routing protocols.
- To acquire knowledge on Wireless Application Protocols.

Pre-requisites

- Computer Networks

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Acquire the basics of mobile telecommunication system.	Understand
CO2	Categorize generations of telecommunication systems in wireless network.	Understand
CO3	Analyse the different methods of Wireless technologies.	Understand
CO4	Identify the working principle of routing protocol in wireless networks.	Apply
CO5	Explore the functionality of Transport and Application layer.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	2	2	2	-	2	2	2	-	2	3	3	-
CO2	3	3	3	2	2	2	-	2	2	2	-	2	3	3	-
CO3	3	3	3	2	2	2	-	2	2	2	-	2	3	3	-
CO4	3	3	3	3	3	2	-	2	2	2	-	2	3	2	-
CO5	3	3	3	3	3	2	-	2	2	2	-	2	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	20	30
Understand	30	30	60
Apply	-	10	10
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
60 IT 701- Mobile Communication								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Wireless Communication Fundamentals** Introduction –Wireless transmission –Frequencies for radio transmission –Signals —Spread spectrum – MAC –SDMA –FDMA –TDMA –CDMA –Satellite Systems-Broadcast Systems –DAB –DVB	[9]
Digital Cellular Technology* Generation of Cellular Wireless Networks -GSM –GPRS –DECT–EDGE–UMTS –IMT-2000	[9]
Wireless Networking Technologies* Wireless LAN –IEEE 802.11 Family –Architecture –services –MAC –Physical layer – Introduction-HIPERLAN 1 –Blue Tooth-Wi-Fi–WiMAX–Protocol Architecture–Long Term Evolution Advanced	[9]
Mobile Network Layer* Mobile IP –Dynamic Host Configuration Protocol – Ad Hoc– Proactive and Reactive Routing Protocols — Multicast Routing- Vehicular Ad Hoc networks (VANET) –MANET Vs VANET — Security	[9]
Transport and Application layers* Traditional TCP –Classical TCP improvements – Mobile TCP–WAP –Architecture –WDP –WTL WTP – WSP –WAE –WTA Architecture –WML	[9]
Total Hours:	**45**

Text Book(s):	
1.	Jochen Schiller, “Mobile Communications”, PHI, 2nd Edition, 2019.
2.	Rappaport ,“Wireless Communications Principles and Practice”, Pearson, 2nd Edition,2010.
Reference(s):	
1.	Prasant Kumar Pattnaik, RajibMall, “Fundamentals of Mobile Computing”, PHI LearningPvt.Ltd, NewDelhi,2012.
2.	Dharma Prakash Agarval, Qing and An Zeng, “Introduction to Wireless and Mobile systems”,Thomson Asia Pvt Ltd, 4th Edition,2014.
3.	William.C.Y.Lee, “Mobile Cellular Telecommunications-Analog and Digital Systems”, 2ndEdition,Tata Mc Graw Hill Edition, 2nd Edition,2006.
4.	Frank Adelstein, Sandeep Gupta , Golden Richard, Loren Schwiebert, “Fundamentals of Mobile and Pervasive Computing”,1st Edition,2005.

*SDG 9 – Industry Innovation and Infrastructure

**SDG4 –Quality of Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Wireless Transmission**	
1.1	Frequencies for radio transmission	1
1.2	Signals	1
1.3	Spread spectrum	1
1.4	MAC	1
1.5	SDMA – FDMA	1
1.6	TDMA	1
1.7	CDMA	1
1.8	Satellite Systems	1
1.9	Broadcast Systems –DAB –DVB	1
2.0	**Digital Cellular Technology**	
2.1	Generation of Cellular Wireless Networks	2
2.2	GSM Architecture & Handover	2
2.3	GPRS Architecture & Protocol Stack	1
2.4	DECT	1
2.5	EDGE	1
2.6	UMTS	1
2.7	IMT-2000	1
3.0	**Wireless Networking Technologies**	
3.1	Wireless LAN	1
3.2	IEEE 802.11 Family –Architecture	1
3.3	Services-MAC	1
3.4	Physical layer	1
3.5	Introduction-HIPERLAN 1	1
3.6	Blue Tooth - WiFi	1
3.7	WiMAX	1
3.8	Protocol Architecture	1
3.9	Long Term Evolution Advanced	1
4.0	**Mobile Network Layer**	
4.1	Mobile IP	1
4.2	Dynamic Host Configuration Protocol	1
4.3	Introduction to Ad Hoc Routing protocol	1
4.4	Proactive Routing Protocols	1
4.5	Reactive Routing Protocols	1
4.6	Multicast Routing	1
4.7	Vehicular Ad Hoc networks (VANET)	1
4.8	MANET Vs VANET	1
4.9	Security	1
5	**Transport and Application Layers**	

5.1	Traditional TCP	1
5.2	Classical TCP improvements	1
5.3	Mobile TCP	1
5.4	WAP Architecture	1
5.5	WDP- WTLS	1
5.6	WTP – WSP	1
5.7	WAE	1
5.8	WTA Architecture	1
5.9	WML	1

Course Designer(s)

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60 IT 702	Cryptography And Network Security	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the principles of encryption algorithms and application-level security mechanisms.
- To know the methods of conventional encryption, and the concepts of public key encryption.
- To learn the various authentication and Hash functions.
- To be familiar with the network security tools and applications
- To understand the concept of system level security, Cloud and Wireless Security.

Pre-requisites

- Basic Knowledge of Computer Networks

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Realize the knowledge about Block Cipher design principles, Advanced Encryption Standard, and reliable transfer of keys between two users.	Remember
CO2	Analyse the knowledge about the confidentiality factors and encryption techniques.	Understand
CO3	Know the authentication and confidentiality hash function and to expel the third-party penetration in a mail transfer between two parties.	Apply
CO4	Recognize the authentication application and Internet security.	Apply
CO5	Identify various kinds of intruders and virus and learn about the firewall principles and techniques.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	-	-	2	-	-	2	-	2	3	3	-
CO2	3	3	-	-	-	-	2	-	-	2	-	2	3	3	-
CO3	3	3	-	2	-	-	-	2	-	-	-	-	3	3	-
CO4	3	3	-	-	-	-	-	2	-	2	-	-	3	3	-
CO5	2	3	-	-	-	-	3	-	-	-	2	-	3	3	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	10	20
Understand	30	30	30
Apply	-	20	30
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech– Information Technology								
60 IT 702- Cryptography and Network Security								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction* OSI Security Architecture – Classical Encryption Techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles – Advanced Encryption Standard – Block Cipher Operation.	[9]
Public Key Cryptography* Key Management – Key Distribution – Distribution of Public Keys - Public-Key Cryptography and RSA – Diffie Hellman Key Exchange – Elliptic Curve Arithmetic – Elliptic Curve Cryptography.	[9]
Authentication and Data Integrity Algorithms* Application of Cryptographic Hash Functions – Requirements and Security of Hash Functions – Secure Hash Algorithm – Message Authentication Codes – Authentication Requirements – Authentication Functions – HMAC - Digital Signatures – Digital Signature Standard.	[9]
Network and Internet Security** User Authentication – Authentication Principles – Authentication Using Symmetric Encryption – Kerberos – Electronic Mail Security – PGP – S/MIME – IP Security – IP Security Overview – IP Security Policy.	[9]
System Security** Intrusion Detection – Password Management – Viruses and Related Threats – Virus Counter Measures – Firewall Design Principles – Trusted Systems, Wireless Security, Mobile Device Security, Cloud Security.	[9]
Total Hours:	**45**

Text Book(s):	
1.	William Stallings, “Cryptography and Network Security – Principles and Practices”, 8th Edition, Pearson, 2023
2.	Behrouz A. Forouzen, Dabdeep Mukhopadhya, “Cryptography and Network Security”, 3rd Edition,Tata McGraw-Hill, 2015.
Reference(s):	
1.	Atul Kahate, “Cryptography and Network Security”, 4th Edition,Tata McGraw-Hill, 2019.
2.	WM. Arthur Conklin and Greg White. “Principles of Computer Security”,TMH, 2016.
3.	Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015
4.	William Stallings,”Network Security Essentials Applications and Standards” 6th Edition,Pearson,2011

*SDG 4 – Quality in Education

**SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	OSI Security Architecture	2
1.2	Classical Encryption Techniques	2
1.3	Cipher Principles	1
1.4	Data Encryption Standard	1
1.5	Block Cipher Design Principles	1
1.6	Advanced Encryption Standard	1
1.7	Block Cipher Operation	1
2.0	**Public Key Cryptography**	
2.1	Key Management	1
2.2	Key Distribution	1
2.3	Distribution of Public Keys	1
2.4	Public-Key Cryptography	1
2.5	RSA	2
2.6	Diffie Hellman Key Exchange	1
2.7	Elliptic Curve Arithmetic.	1
2.8	Elliptic Curve Cryptography	1
3.0	**Authentication and Data Integrity Algorithms**	
3.1	Application of Cryptographic Hash Functions	1
3.2	Requirements and Security of Hash Functions	1
3.3	Secure Hash Algorithm	1
3.4	Message Authentication Codes	1
3.5	Authentication Requirements	1
3.6	Authentication Functions	1
3.7	HMAC	1
3.8	Digital Signatures	1
3.9	Digital Signature Standard	1
4.0	**Network And Internet Security**	
4.1	User Authentication– Authentication Principles	1
4.2	Authentication using Symmetric Encryption	1
4.3	Kerberos	1
4.4	Electronic Mail Security	1
4.5	PGP	1
4.6	S/Mime	1
4.7	IP Security	1
4.8	IP Security over View	1
4.9	IP Security Policy	1
5.0	**System Security**	
5.1	Intrusion Detection	1
5.2	Password Management	1
5.3	Viruses and Related Threats	1
5.4	Virus Counter Measures	1
5.5	Firewall Design Principles	1
5.6	Trusted Systems	1
5.7	Wireless Security	1
5.8	Mobile Device Security	1
5.9	Cloud Security	1

Course Designer(s)

1. K.Mahalakshmki - mahalakshmik@ksrct.ac.in

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60 IT 703	Cloud Computing	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To introduce the broad perceptive of Cloud service and Deployment models
- To understand the concept of Cloud Infra structure and Virtualization concepts
- To understand the Advanced and Specialized Cloud Architectures.
- To understand the principles and applications of Cloud Programming Paradigms.
- To know the cloud security challenges, risk management, and various security measures across different layers/ sectors of cloud services.

Pre-requisites

- Basic knowledge of Computer Networks.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the service and delivery models of cloud computing	Understand
CO2	Describe the cloud infra-structure and virtualization concept	Understand
CO3	Possess the knowledge and able to choose, implement, and optimize diverse cloud architectures	Apply
CO4	Summarize the need and application of cloud programming paradigms.	Understand
CO5	Address the core issues of cloud computing such as security, privacy and interoperability	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	2	2	-	-	3	2	-	2	-	3	2	3
CO2	3	2	-	2	2	-	-	3	2	-	2	-	3	2	3
CO3	3	-	3	3	3	-	-	3	3	-	2	-	3	3	3
CO4	3	3	3	2	3	-	-	2	2	-	2	-	3	3	2
CO5	3	2	3	2	3	-	-	3	3	-	2	-	3	2	2
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	20	-	17	17
Understand	40	40	66	49
Apply	-	20	17	17
Analyse		-	-	17
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B. Tech – Information Technology

60 IT 703 – Cloud Computing

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

UNIT I INTRODUCTION Technologies for Network-Based System, System Models for Distributed Computing -Cloud Models: Characteristics - Cloud Service models (IaaS, PaaS, SaaS) – Cloud Deployment models - Cloud ecosystem, Service management – Computing on demand–Introduction to Commercial Cloud Platforms (e.g., Amazon AWS, Google Cloud).	[9]
UNIT II CLOUD INFRA STRUCTURE AND VIRTUALIZATION Data Center Infrastructure and Equipment, Virtual Machines, Containers, Virtual Networks, Virtual Storage	[9]
UNIT III CLOUD ARCHITECTURES * NIST Cloud Computing Reference Architecture, Advanced Cloud Architectures: Hypervisor Clustering Architecture, Load Balanced Virtual Server Instances Architecture, Non-Disruptive Service Relocation Architecture, Zero Downtime Architecture, Resource Reservation Architecture - Specialized Cloud Architectures: Direct I/O Access Architecture, Direct LUN Access Architecture, Dynamic Data Normalization Architecture.	[9]
UNIT IV CLOUD PROGRAMMING PARADIGMS MapReduce Programming Paradigm, Microservices, Controller Based Management Software, Serverless Computing and Event Processing, DevOps: CI/CD Pipelines and Their Role in Cloud DevOps.	[9]
UNIT V SECURITY IN THE CLOUD ** Security Overview - Cloud Security Challenges and Risks - Software-as-a-Service Security - Security Governance - Risk Management - Security Monitoring - Security Architecture Design – Data Security - Application Security - Virtual Machine Security - Identity Management and Access Control - Autonomic Security, Data Protection and Privacy Compliance (e.g., GDPR - Europe), Sector-specific Data Compliance (e.g., HIPAA for Healthcare and Finance)	[9]
Total Hours:	**45**

Text Book(s):

1.	Douglas E. Comer, “The Cloud Computing Book: The Future of Computing Explained”, 1st edition, CRC press, 2021.
2.	Zaigham Mahmood, Ricardo Puttini, Thomas Erl, “Cloud Computing: Concepts, Technology & Architecture”, 1st edition, Pearson, 2013.

Reference(s):

1.	Barrie Sosinsky, “Cloud Computing Bible”, 2nd edition, Wiley Publishing, 2011.
2.	Sandeep Bhowmik, “Cloud Computing”, Cambridge University Press, 2nd edition, 2017.
3.	Lizhe Wang, Rajiv Ranjan, Jinjun Chen, Boualem Bentallah, "Cloud Computing: Methodology, Systems and Applications", 1st edition, CRC Press, 2017
4.	George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud”, 1st edition, Orelly’s, 2009

*SDG 4 – Quality Education

**SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**INTRODUCTION**	
1.1	Technologies for Network-Based System	1
1.2	System Models for Distributed and Cloud Computing	1
1.3	Cloud models: Characteristics	1
1.4	Cloud service models (IaaS, PaaS, SaaS)	1
1.5	Cloud Deployment models	1
1.6	Cloud ecosystem	1
1.7	Service management, Computing on demand	1
1.8	Introduction to Commercial Cloud Platforms – Amazon AWS	1
1.9	Google Cloud	1
2.0	**VIRTUALIZATION**	
2.1	Data Center Infrastructure and Equipment	1
2.2	Virtual Machines: Properties of virtualization, level of trust	1
2.3	Virtual IO device, VM Migration	1
2.4	Containers: Traditional Apps, Elasticity on demand	1
2.5	Docker Container, Docker Software Components	1
2.6	Virtual Networks: VLAN	1
2.7	NAT, Managing Virtualization and mobility	1
2.8	Virtual Storage: NAS Technology	1
2.9	SAN Technology, Hyper Converged Infra-structure	1
3.0	**CLOUD ARCHITECTURES**	
3.1	NIST Cloud Computing Reference Architecture	1
3.2	Advanced Cloud Architectures: Hypervisor Clustering Architecture	1
3.3	Load Balanced Virtual Server Instances Architecture	1
3.4	Non-Disruptive Service Relocation Architecture	1
3.5	Zero Downtime Architecture, Resource Reservation Architecture	1
3.6	Direct LUN Access Architecture, Dynamic Data Normalization Architecture	1
3.7	Specialized Cloud Architectures: Direct I/O Access Architecture	1
3.8	Direct LUN Access Architecture	1
3.9	Dynamic Data Normalization Architecture	1
4.0	**CLOUD PROGRAMMING PARADIGMS**	
4.1	The MapReduce Paradigm: Software in a Cloud Environment	1
4.2	Trade-off and Limitations of Parallel Approach, Parallelism and Data size	1
4.3	Mathematical Description	1
4.4	HDFS components, Using Hadoop for MapReduce computations	1
4.5	Microservices	1
4.6	Controller Based Management Software	1
4.7	Serverless Computing and Event Processing	1
4.8	DevOps: CI/CD Pipelines	1
4.9	Role in Cloud DevOps	1
5.0	**SECURITY IN THE CLOUD**	
5.1	Security Overview - Cloud Security Challenges and Risks	1
5.2	Software-as-a-Service Security	1
5.3	Security Governance, Risk Management	1

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5.4	Security Monitoring	1
5.5	Security Architecture Design, Data Security	1
5.6	Application Security, Virtual Machine Security	1
5.7	Identity Management and Access Control - Autonomic Security	1
5.8	Data Protection and Privacy Compliance (e.g., GDPR - Europe)	1
5.9	Sector-specific Data Compliance (e.g., HIPAA for Healthcare and Finance)	1
	Total	45

Course Designer(s)

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60 IT 704	Computer Graphics and Virtual Reality	Category	L	T	P	Credit
		PC	2	0	2	3

Objectives

- To know various output primitives
- To understand 2D and 3D geometric objects
- To acquire knowledge of 3D transformation and viewing
- To study basics of virtual reality
- To explore VR modelling and rendering

Pre-requisites

- Knowledge of data structures and algorithm

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify basic primitives of computer graphics and algorithms to implement.	Remember
CO2	Implement 2D transformation and viewing 2D objects.	Understand
CO3	Understand 3D transformation and viewing.	Apply
CO4	Apply the virtual reality primitives.	Understand
CO5	Simulate VR environment with modelling.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	2	-	-	-	-	-	-	3	-	1
CO2	2	2	-	-	-	-	1	1	-	-	3	-	-	2	-
CO3	2	1	-	-	3	-	-	-	-	2	-	-	-	-	1
CO4	2	2	-	1	-	-	-	2	-	-	1	-	-	-	-
CO5	2	2	-	-	2	-	-	-	2	-	-	1	2	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	10	-	-	20	-
Understand	40	-	30	-	-	20	-
Apply	-	50	20	50	50	50	50
Analyse	-	50	-	50	50	10	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.E – Information Technology

60 IT 704 - Computer Graphics and Virtual Reality

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100

Output Primitives Overview of Graphics System – Points and Lines - Line Drawing Algorithms – DDA , Bresenham - Circle and Ellipse Generating Algorithms – Line Attributes – Curve Attributes – Color and Grayscale Levels – Area fill attributes – Character attributes	[6]
Two-Dimensional Transformations and Viewing Two-Dimensional Geometric Transformations – Two-Dimensional Viewing - Three-Dimensional Object Representations – Polygon surfaces, Spline surfaces, Bezier curves - Octrees ++	[6]
Three-Dimensional Concepts Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing	[6]
Introduction to Virtual Reality Introduction to Virtual Reality – Definition – Three I"s of Virtual Reality – Virtual Reality Vs 3D Computer Graphics – Benefits of Virtual Reality - Components of VR System - Input Devices – 3D Position Trackers -Performance Parameters – Types of Trackers - Navigation and Manipulation Interfaces – Gesture Interfaces – Types of Gesture Input Devices. Output Devices – Graphics Display – Human Visual System – Personal Graphics Displays – Large Volume Displays – Sound Displays – Human Auditory System.	[6]
VR Modeling Modeling - Geometric Modeling - Virtual Object Shape - Object Visual Appearance - Kinematics Modeling - Transformation Matrices - Object Position - Transformation Invariants - Object Hierarchies - Viewing the 3D World - Physical Modeling - Collision Detection - Surface Deformation - Force Computation - Force Smoothing and Mapping - Behavior Modeling - Model Management.	[6]
Practical: 1. Line Drawing Algorithm - DDA 2. Line Drawing - Bresenham's Algorithm 3. Mid-point Circle Algorithm 4. Ellipse generation Algorithm 5. 2D Transformations such as Translation, Rotation, Scaling, Reflection And Sharing 6. 2D clipping by Cohen-Sutherland Algorithm 7. 3D Transformation such as Translation 8. 3D Transformations such as Rotation and Scaling 9. Create 3D realistic scenes and Develop Simple Virtual Reality Enabled Mobile Applications 10. Add Audio and Text Special Effects to the Developed Application **Tools used: C, MATLAB**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1. Donald Hearn and Pauline Baker M, "Computer Graphics C Version", 3rd Edition, Pearson Education, 2011.
2. Prabhat K.Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2009.
3. Grigore C. Burdea, Philip Coiffet, "Virtual Reality Technology", 2nd Edition, Wiley India, 2006.
4. John Vince, "Introduction to Virtual Reality", Springer-Verlag Ltd., 2004

Reference(s):

1. Foley James D, Van Dam, Feiner and Hughes, "Computer Graphics: Principles and Practice", Pearson Education.
2. Donald Hearn and Pauline Baker, "Computer Graphics C Version", Pearson Education.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Output Primitives**	
1.1	Overview of Graphics System – Points and Lines	1
1.2	Line Drawing Algorithms – DDA , Bresenham	1
1.3	Circle Generating Algorithms	1
1.4	Ellipse Generating Algorithms	1
1.5	Line Attributes – Curve Attributes	1
1.6	Color and Grayscale Levels – Area fill attributes – Character attributes	1
2.0	**Two-Dimensional Transformations and Viewing**	
2.1	Two-Dimensional Geometric Transformations	1
2.2	Two-Dimensional Viewing	1
2.3	Three-Dimensional Object Representations	1
2.4	Polygon surfaces	1
2.5	Spline surfaces	1
2.6	Bezier curves - Octrees	1
3.0	**Three-Dimensional Concepts**	
3.1	Three-Dimensional Concepts	2
3.2	Three-Dimensional Geometric	2
3.3	Modeling Transformations	2
4.0	**Introduction To Virtual Reality**	
4.1	Introduction to Virtual Reality – Definition – Three I"s of Virtual Reality	1
4.2	Virtual Reality Vs 3D Computer Graphics – Benefits of Virtual Reality - Components of VR System	1
4.3	Input Devices – 3D Position Trackers -Performance Parameters	1
4.4	Types of Trackers - Navigation and Manipulation Interfaces – Gesture Interfaces – Types of Gesture Input Devices.	1
4.5	Output Devices – Graphics Display – Human Visual System – Personal Graphics Displays	1
4.6	Large Volume Displays – Sound Displays – Human Auditory System.	1
5.0	**VR Modeling**	
5.1	Modeling - Geometric Modeling - Virtual Object Shape	1
5.2	Object Visual Appearance - Kinematics Modeling - Transformation Matrices	1
5.3	Object Position - Transformation Invariants	1
5.4	Object Hierarchies - Viewing the 3D World - Physical Modeling	1
5.5	Collision Detection - Surface Deformation - Force Computation	1
5.6	Force Smoothing and Mapping - Behavior Modeling - Model Management	1
Practical:		
10.	Line Drawing Algorithm - DDA	2
11.	Line Drawing - Bresenham's Algorithm	2
12.	Mid-point Circle algorithm	4
13.	Ellipse generation algorithm	2
14.	2D Transformations Such as Translation, Rotation, Scaling, Reflection and Sharing	4
15.	2D Clipping by Cohen-Sutherland Algorithm	4
16.	3D Transformation such as Translation	2
17.	3D Transformations such as Rotation and Scaling	2
18.	Create 3D Realistic Scenes and Develop Simple Virtual Reality Enabled Mobile Applications	4
19.	Add Audio and Text Special Effects to the Developed Application	4

Course Designer(s)

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Rev. No.1/w.e.f. 19/07/2025
Approved Passed in BoS Meeting held on 18/06/2025
in Academic Council Meeting held on 19/07/2025

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60 IT 705	Software Testing	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To introduce the basics and necessity of software testing.
- To provide various testing techniques along with concepts of software bugs and its impact.
- To develop and validate a test plan.
- To build a testing team required.
- To understand the need for the challenges in test automation and to develop testing scripts.

Pre-requisites

- Basic knowledge of Software Engineering, Software automation tools.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Obtain an insight to software testing.	Understand
CO2	Apply both black box testing and white box testing.	Apply
CO3	Understand and apply multiple levels of testing.	Apply
CO4	Understand the role of a tester as an individual and as a team member.	Analyse
CO5	Apply software testing for large projects using automated testing tools.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	20	20	60
Apply	30	20	10
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
60 IT 705 – Software Testing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction to Software Testing Testing as an Engineering Activity - Testing Maturity Model - SDLC- Scope of Testing -Software Testing Principles – Origins and Cost of Defects – Defect Classes and Examples – Developer/Tester Support of Developing a Defect Repository – Defect Prevention Strategies.	[9]
Software Testing Methodology Test Case Design Strategies – Black Box Approach – Random Testing - Boundary Value Analysis – Equivalence Class Partitioning – White Box Approach – Static Testing vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Cyclomatic Complexity – Test Adequacy Criteria.	[9]
Software Testing Techniques* Need for Levels of Testing - Unit Test – Planning – Designing the Unit Test Process – Running the Unit Tests and Recording Results – Integration Test Planning – Scenario Testing –System Testing – Acceptance Testing – Performance Testing – Regression Testing –Internationalization Testing.	[9]
Test Management Organization Structures for Testing Teams – Testing Services – Test Planning Attachments– Locating Test Items – Test Management – Reporting Test Results – The Role of Three Groups in Test Planning and Policy Development – Introducing the Test Specialist – Skills Needed by a Test Specialist – Building a Testing Group.	[9]
Automation and Software Testing Tools** Software Test Automation – Skill Needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation– Rational Testing Tools, Java Testing Tools – JavaMelody – Selenium – JUnit - JMeter- JSUnit, NUnit.	[9]
Total Hours:	**45**

Text Book(s):

1. Paul C. Jorgensen, “Software Testing: A Craftsman’s Approach”, 4th Edition, CRC Press, 2013.
2. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2012.

Reference(s):

1. Glenford J. Myers, Tom Badgett, Corey Sandler, “The Art of Software Testing”, 3rd Edition, John Wiley & Sons, 2012.
2. Srinivasan Desikan, Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2009.
3. Dorothy Graham, Mark Fewster, “Experiences of Test Automation: Case Studies of Software Test Automation”, Pearson Education, 2012.
4. Boris Beizer, “Software Testing Techniques”, Dream Tech Press, 2009.

* SDG-4 – Quality Education

** SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction to Software Testing**	
1.1	Testing as an Engineering Activity	1
1.2	Testing Maturity Model	1
1.3	SDLC - Scope of Testing	1
1.4	SDLC - Scope of Testing	1
1.5	Software Testing Principles	1
1.6	Origins and Cost of Defects	1
1.7	Defect Classes and Examples	1
1.8	Developer/Tester Support of Developing a Defect Repository	1
1.9	Defect Prevention Strategies	1
2.0	**Software Testing Methodology**	
2.1	Test Case Design Strategies	1
2.2	Black Box Approach – Random Testing	1
2.3	Boundary Value Analysis	1
2.4	Equivalence Class Partitioning	1
2.5	White Box Approach	1
2.6	Static Testing vs. Structural Testing	1
2.7	Code Functional Testing	1
2.8	Coverage and Control Flow Graphs – Covering Code Logic	1
2.9	Paths – Cyclomatic Complexity – Test Adequacy Criteria	1
3.0	**Software Testing Techniques**	
3.1	Need for Levels of Testing	1
3.2	Unit Test – Planning	1
3.3	Designing the Unit Test Process	1
3.4	Running the Unit Tests and Recording Results	1
3.5	Integration Test Planning – Scenario Testing	1
3.6	System Testing	1
3.7	Acceptance Testing	1
3.8	Performance Testing – Regression Testing	1
3.9	Internationalization Testing	1
4.0	**Test Management**	
4.1	Organization Structures for Testing Teams	1
4.2	Testing Services – Test Planning Attachments	1
4.3	Locating Test Items	1
4.4	Test Management	1
4.5	Reporting Test Results	1
4.6	The Role of Three Groups in Test Planning and Policy Development	1
4.7	Introducing the Test Specialist	1
4.8	Skills Needed by a Test Specialist	1
4.9	Building a Testing Group	1
5.0	**Automation and Software Testing Tools**	
5.1	Software Test Automation	1
5.2	Skill Needed for Automation – Scope of Automation	1
5.3	Design and Architecture for Automation	1
5.4	Requirements for a Test Tool	1

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5.5	Challenges in Automation	1
5.6	Rational Testing Tools	1
5.7	Java Testing Tools	1
5.8	JavaMelody – Selenium – JUnit - JMeter	1
5.9	JSUnit, NUnit	1
	Total	45

Course Designer(s)

1. Mr.R. Arunkumar - rarunkumar@ksrct.ac.in

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60 AC 001	Research Skill Development	Category	L	T	P	Credit
		AC	1	0	0	0

Objectives

- To identify research problems, formulate hypotheses, collect data and test hypotheses
- To prepare and submit quality manuscripts and understand peer review process
- To utilize software tools for effective manuscript preparation and visualization of research data
- To familiarize different journal metrics and author-level quality indicators
- To protect creative works, inventions, and branding elements using IPR

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Develop structured scientific approach to plan and execute research work	Apply
CO2	Comply with the journal requirements to publish research findings effectively	Understand
CO3	Apply various software tools during the manuscript preparation	Apply
CO4	Select suitable journals to publish the work using different publication metrics	Analyse
CO5	Apply the appropriate form of IP protection to a specific invention or creation	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	2	-	2	2	3	3	3	-	3	-	-	-
CO2	-	-	-	-	-	-	-	3	3	3	-	3	-	-	-
CO3	-	-	-	-	3	-	-	3	3	3	-	3	-	-	-
CO4	-	-	-	-	-	-	-	3	3	-	-	3	-	-	-
CO5	-	-	2	2	-	-	-	3	3	3	-	3	-	-	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

One review at end of the semester

Parameters	Weightage (Marks)
Research Problem Identification (Research Gap, SDG, Objectives)	10
Literature Review Preparation (Clarity, Number and Quality of Sources)	20
Patent Draft/ Manuscript Preparation (Structure, Content)	20
Use Of Software Tools (Plagiarism, Reference Management, etc.,)	10
Journal Identification (Aim & Scope of The Journal, Journal Metrics)	10
Presentation & Viva Voce	30
Total	**100**

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
60 AC 001 – Research Skill Development								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	1	0	0	15	0	100	-	100

Research - Scientific Approach* Types Of Research - Identification and Clarification of the Problem – Problem Analysis - Formulating Hypothesis, Selection of Sample and Tools of Data Collection - Testing the Hypothesis - Conclusion	[3]
Manuscript Preparation* Structure of a Manuscript - Types of Manuscript - Graphical Abstract - Highlights - Literature Review - Citation - Reference Style - Plagiarism – Journal Selection - Peer Review Process	[3]
Research Toolkit* Software Tools for Writing Enhancement - Literature Review - Reference Management - Data Analysis and Visualization - Drawing - Plagiarism	[3]
Research Publication Metrics* Journal Index: Scopus - Web of Science - Sci - Ugc Care - Q Journal; Journal Metrics: Impact Factor, Cite Score; Quality Indicators: H-Index - I-10 Index - Citations	[3]
Intellectual Property Rights* Patents - Industrial Designs - Copyright - Trademarks - Geographical Indications - Trade Secrets	[3]
Total Hours:	**15**

Reference(s):

1.	Kothari, C.R. and Gaurav Garg, “Research Methodology: Methods and Techniques”, New Age International Publishers, 2023
2.	Chawla H S., “Introduction to Intellectual Property Rights”, CBS Publishers and Distributors Private Limited, 2019

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Research - Scientific Approach**	
1.1	Types of Research - Identification and Clarification of the problem - Formulating hypothesis	2
1.2	Selection Of Sample and Tools of Data Collection - Testing the Hypothesis - Conclusion	1
2.0	**Manuscript Preparation**	
2.1	Structure Of a Manuscript - Types of Manuscript - Graphical Abstract - Highlights	1
2.2	**Literature Review**	1
2.3	Citation - Reference Style – Plagiarism, Journal Selection - Peer Review Process	1
3.0	**Research Toolkit**	
3.1	Software Tools for Writing Enhancement	1
3.2	Literature Review, Reference Management	1
3.3	Data Analysis and Visualization – Drawing, Plagiarism	1
4.0	**Research Publication Metrics**	
4.1	Journal Index: Scopus - Web Of Science - SCI - UGC Care - Q Journal;	1
4.2	Journal Metrics: Impact Factor, Cite Score	1
4.3	Quality Indicators: h-index - i-10 index - citations	1
5.0	**Intellectual Property Rights**	
5.1	Patents	1
5.2	Industrial Designs - Copyright	1
5.3	Trademarks - Geographical Indications - Trade Secrets	1

Course Designer

1. Dr.M.Kathirselvam - mkathirselvam@ksrct.ac.in

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60 AB 001	National Cadet Corps - AIR WING	Category	L	T	P	Credit
		HS	2	0	2	3

Objectives

- To designed especially for NCC cadets
- To develop character, camaraderie , discipline, secular outlook
- To inculcate spirit of adventure, sportsman spirit
- To teach selfless service among cadets by working in teams
- To learning military subjects including weapon training and motivate them to join in tri-series

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion	Remember
CO2	Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling	Remember
CO3	Illustrate various forces and moments acting on aircraft	Apply
CO4	Outline the concepts of aircraft engine and rocket propulsion	Apply
CO5	Design, build and fly chuck gliders/model airplanes and display static models	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	3	3	3	3	3	-	-	-	-	-
CO2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.TECH – Information Technology								
60 AB 001 - National Cadet Corps - AIR WING								
Common to ALL Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	2	0	2	60	3	50	50	100

NCC Organisation and National Integration NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC Cadets – Aim and Advantages of NCC Training- NCC Badges of Rank- Honors" and Awards – Incentives for NCC Cadets by Central and State Govt. History and Organization of IAF-Indo-PakWar-1971- Operation Safed Sagar. National Integration-Unity in Diversity – Contribution of Youth in Nation Building – National Integration Council-Images and Slogans on National Integration	[12]
Drill and Weapon Training Basic Physical Training- Various Exercises for Fitness (with Demonstration) - Food- Hygiene and Cleanliness. Drill-Words of Commands- Position and Commands- Sizing and Forming- Saluting-Marching- Turning on the March and Wheeling- Saluting on the March-Sidepace, Pace Forward and Other Ear-Marking Time – Drill with Arms-Ceremonial Drill-Guard Mounting (WITHDEMONSTRATION)	[12]
Principles of Flight Laws of Motion- Forces Acting on Aircraft- Bernoulli's Theorem- Stalling-Primary Control Surfaces-Secondary Control Surfaces- Aircraft Recognition.	[12]
Aero Engines Introduction of Aero Engine- Types of Engine- Piston Engine- Jet Engines- Turboprop Engines-Basic Flight Instruments-Modern Trends	[12]
Aero Modeling History of Aero Modeling- Materials Used in Aero Modeling- Types of Aero Models – Static Models-Gliders-Control Line Models- Radio Control Models- Building and Flying of Aero Models.	[12]
Total Hours:	**60**

Text Book(s):	
1.	"National Cadet Corps - A Concise hand book of NCC Cadets", Ramesh Publishing House, NewDelhi, 2014.
Reference(s):	
1.	"Cadets Handbook - Common Subjects SD/SW ", published by DGNCC, New Delhi.
2.	"Cadets Handbook – Specialized Subjects SD/SW ", published by DGNCC, New Delhi.
3.	"NCCOTA Precise", published by DGNCC, NewDelhi.

ESE	The examination and award of marks will be done by the Ministry of Defence, Government of India which includes all K1 to K4 knowledge levels. The maximum marks for the End Semester Examination is 500 marks. It will be converted to100 marks.

Course Designer(s)

1. Flt.Lt.V.R.Sadasivam – sadasivam@ksrct.ac.in

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60 AB 002	National Cadet Corps - Army Wing	Category	L	T	P	Credit
		HS	2	0	2	3

Objectives

- Develop character, camaraderie
- Inculcate discipline, secular outlook
- Enrich the spirit of adventure, sportsman spirit
- Ideals of selfless service amongst cadets by working in teams
- Improve qualities such as self-discipline, self-confidence, self-reliance and dignity of labour in the cadets

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will carry out nation building through national unity and social cohesion.	Apply
CO2	Demonstrate Health Exercises, the sense of discipline, improve bearing, smartness, turn out, and develop the quality of immediate and implicit obedience of orders.	Apply
CO3	Basic knowledge of weapons and their use and handling.	Understand
CO4	Aware about social evils and shall inculcate sense of whistle blowing against such evils and ways to eradicate such evils	Apply
CO5	Acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information about expansion of Armed Forces, service subjects and important battles	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-				-	-
CO5	3	-	-	-	-	-	-	-	2	2	-	2	-	-	2
3 - Strong; 2 - Medium; 1 - Some															

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.TECH – Information Technology								
60 AB 002 – National Cadet Corps (Army Wing)								
Common to ALL Branches								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
II	2	0	2	60	3	50	50	100

NCC Organization & National Integration NCC Organization – History of NCC- NCC Organization- NCC Training- NCC Uniform – Promotion of NCC Cadets – Aim and Advantages of NCC Training- NCC Badges of Rank- Honors' and Awards – Incentives for NCC Cadets by Central and State Govt. National Integration - Unity in Diversity- Contribution of Youth in Nation Building- National Integration Council- Images and Slogans on National Integration	[12]
Basic Physical Training & Drill Basic Physical Training – Various Exercises for Fitness (with Demonstration)-Food – Hygiene and Cleanliness. Drill- Words of Commands- Position and Commands- Sizing and Forming- Saluting- Marching- Turning on the March and Wheeling- Saluting on the March- Side Pace, Pace Forward and to the Rear- Marking Time- Drill with Arms- Ceremonial Drill- Guard Mounting. (WITH DEMONSTRATION)	[12]
Weapon Training Main Parts of a Rifle- Characteristics of .303 Rifle- Characteristics of .22 Rifle- Loading and Unloading – Position and Holding Safety Precautions – Range Procedure- MPI and Elevation- Group and Snap Shooting- Long/Short Range Firing(WITH PRACTICE SESSION) - Characteristics of 5.56mm Rifle- Characteristics of 7.62mm SLR- LMG- Carbine Machine Gun – Pistol.	[12]
Social Awareness And Community Development Aims of Social Service-Various Means and Ways of Social Services- Family Planning – HIV and AIDS- Cancer its Causes and Preventive Measures- NGO and their Activities- Drug Trafficking- Rural Development Programmes - MGNREGA-SGSYJGSY-NSAP-PMGSY-Terrorism and Counter Terrorism- Corruption – Female Foeticide -Dowry –Child Abuse-RTI Act- RTE Act- Protection of Children from Sexual Offences Act- Civic Sense and Responsibility	[12]
Specialized Subject(Army) Basic Structure of Armed Forces- Military History – War Heroes- Battles of Indo-Pak War- Param Vir Chakra- Career in the Defence Forces- Service Tests and Interviews.	[12]
Total Hours:	**60**

Text Book(s):	
1.	National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014.
2.	Crouse W. Cadets Handbook- Specialized Subjects SD/SW published by DG NCC, New Delhi,2014.
Reference(s):	
1.	"Cadets Handbook – Common Subjects SD/SW" by DG NCC, New Delhi,2019"Cadets Handbook – Common Subjects SD/SW" by DG NCC, New Delhi,2019
2.	"Cadets Handbook – Specialised Subjects SD/SW" by DG NCC, New Delhi,2017

Course Designer(s)

1. CT E CHANDRA KUMAR - chandrakumar@ksrct.ac.in

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60 IT 7P1	Cloud Computing Laboratory	Category	L	T	P	Credit
		PC	0	0	4	2

Objectives

- To understand the NIST model and its relevance in Cloud Computing.
- To create, running an application and transferring files in/ between Virtual machines using Virtual box/VMware Workstation.
- To know the implementation of cloud setup for storing, accessing an asset and do the scaling process in the cloud environment.
- To acquire the ability to deploy and running web applications using GAE launcher.
- To build a cloud scenario and run a scheduling algorithm

Pre-requisites

- Basic knowledge of computer networking

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand cloud computing environment	Understand
CO2	Install and configure Virtualbox/VMware Workstation with different OS flavours on a Windows platform and run c applications	Apply
CO3	Apply the vertical and horizontal scaling towards the load in cloud environment.	Apply
CO4	Utilize GAE launcher effectively to deploy and manage web applications on Google App Engine	Apply
CO5	Simulate a cloud scenario using CloudSim.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	-	-	2	-	-	3	2	-	2	-	3	2	3
CO2	3	2	-	2	2	-	-	3	2	-	2	-	3	2	3
CO3	3	-	3	3	3	-	-	3	3	-	2	-	3	3	3
CO4	3	3	3	2	3	-	-	2	2	-	2	-	3	3	2
CO5	3	3	3	2	3	-	-	3	3	-	2	-	3	2	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Lab Experiments Assessment (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	Lab	Activity		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	25	12	50	50
Analyse	25	13	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	25	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT 7P1 – Cloud Computing Laboratory								
Semester	**Hours/Week**			**Total Hrs**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	0	0	4	45	2	60	40	100

List of Experiments:

1. Study of NIST model in Cloud Computing.
2. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.*
3. Install a C Compiler in the Virtual Machine Created using Virtual Box and Execute Simple Programs.
4. Find a Procedure to Transfer the Files from one Virtual Machine to Another Virtual Machine
5. Install Google App Engine. Create hello world app and other simple web applications using python/java.
6. Implementation Cloud setup for Storing and accessing assets (e.g., images) in the cloud via a web application.
7. Implementation of horizontal and vertical scaling in cloud environments.
8. Install Hadoop single node cluster and run simple applications like wordcount.
9. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.**
10. Case study about Real Time Analysis of Facebook or Twitter.

Lab Manual	
1.	"Cloud Computing Lab Manual", Department of Information Technology, KSRCT.

*SDG 4 – Quality Education
**SDG 9 – Industry, Innovation and Infra Structure.

Course Designer(s)

1. Mr. R.T.Dinesh Kumar – dineshkumarrt@ksrct.ac.in

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60 IT 7P2	Project Work – Phase I	Category	L	T	P	Credit
		CG	0	0	4	2

Objectives

- To impart practical knowledge to the students
- To apply the gained engineering concepts in their project work
- To provide an exposure to the students to collect and review the research articles, journals, and conference proceedings relevant to their project work
- To design an innovative project work
- To implement the project with the recent IT tools

Pre-requisites

- Subjects From Semester I to VI

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify engineering problems relevant to the domain and perform related literature survey	Apply
CO2	Analyse and identify an appropriate methodology to solve the problem	Apply
CO3	Do experimentation / simulation / programming / fabrication, collect and interpret data	Apply
CO4	Prepare and present their technical report with relevant project work details	Apply
CO5	Demonstrate their responsibility as an individual and as a leader in a team	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	3	3	3	3	3	3	2	2	2
CO2	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
CO4	3	2	2	3	2	2	2	3	3	3	3	3	2	2	2
CO5	3	-	3	-	-	-	2	3	3	3	3	3	2	2	3

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Review I (R1)			Review II (R2)		Review III (R3)			Total (R1+R2+R3)	Internal
Literature Survey	Topic Identification & Justification	Work Plan	Approach	Conclusion	Demo-Existing System	Presentation	Report	Total	
10	10	10	20	20	10	10	10	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech. – Information Technology								
60 IT 7P2 – Project Work – Phase I								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	100	-	100

Methodology:

- Project Work Phase-I shall be evaluated by the project review committee (Project coordinator, Project Guide and HOD/Subject experts in the department).
- Three reviews shall be conducted with subject expert and the student(s) shall make a presentation on the progress made by him / her / them during the reviews.
- Student(s) shall submit a project technical report comprising of title, problem statement, importance of work, modifications, proof of concept, methodology and review of literature during the 3rd review.
- The total marks obtained in the three reviews shall be reduced to 100 marks and rounded to the nearest integer.
- The schedule will be announced by the Project Coordinator and Head of the Department.

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K.S. RANGASAMY COLLEGE OF TECHNOLOGY, TIRUCHENGODE – 637215

(An Autonomous Institution affiliated to Anna University)

B.E. / B.Tech. Degree Programme

SCHEME OF EXAMINATIONS

(For the candidates admitted in 2025 - 2026)

EIGHTH SEMESTER

S.No.	Course Code	Name of the Course	Duration of Internal Exam	Weightage of Marks			Minimum Marks for Pass in End Semester Exam	Total
				Continuous Assessment *	End Semester Exam **	Max. Marks		
THEORY								
1.	60 IT E5*	Professional Elective – V	2	40	60	100	45	100
PRACTICALS								
2.	60 IT 8P1	Project Work Phase - II	2	60	40	100	45	100
3.	60 CG 0P6	Internship	-	100	-	100	-	100

* CA evaluation pattern will differ from course to course and for different tests. This will have to be declared in advance to students. The department will put a process in place to ensure that the actual test paper follow the declared pattern.

** End Semester Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for theory End Semester Examination and 40 marks for project End Semester Examination.

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60 IT 8P1	Project Work – Phase II	Category	L	T	P	Credit
		CG	0	0	16	8

Objectives

- To impart practical knowledge to the students
- To apply the gained engineering concepts in their project work
- To provide an exposure to the students to collect and review the research articles, journals, and conference proceedings relevant to their project work
- To design an innovative project work
- To implement the project with the recent IT tools

Pre-requisites

- Subjects From Semester I to VII

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify engineering problems relevant to the domain and perform related literature survey
CO2	Analyse and identify an appropriate methodology to solve the problem
CO3	Do experimentation / simulation / programming / fabrication, collect and interpret data
CO4	Prepare and present their technical report with relevant project work details
CO5	Demonstrate their responsibility as an individual and as a leader in a team

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	3	3	3	3	3	3	2	2	2
CO2	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3
CO4	3	2	2	3	2	2	2	3	3	3	3	3	2	2	2
CO5	3	-	3	-	-	-	2	3	3	3	3	3	2	2	3

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Internal Assessment (60)					End Semester (40)
Items	Review 1	Review 2	Review 3	Publication	
Marks	5	10	15	30	40
	Total internal marks = 60				

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech. – Information Technology								
60 IT 8P1 – Project Work – Phase II								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	0	0	16	240	8	60	40	100

Methodology:

- The objective of Project Work & Dissertation is to enable the student to extend further investigative a study on the project
- Three reviews shall be conducted by project review committee (Project coordinator, Project Guide and HOD/Subject experts in the department)
- Student(s) shall make a presentation on the progress made by him / her / them during the reviews
- Student(s) shall submit a project technical report comprising of title, problem statement, importance of work, methodology, experimental work and outcome of the work carried out during the 3rd review
- The work carried out may be either under the guidance of a supervisor from the department or jointly with a supervisor drawn from other department / academic institution / R& D laboratory / Industry
- The project reviews (R1+R2+R3+R4) shall carry a maximum of 60 marks
- The project report shall be submitted as per the approved guidelines given by the college, the viva-voce examination shall carry 40 marks
- Marks are awarded to each student of the project group based on the individual performance in the viva-voce examination.

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60 IT E11	Mathematical Foundations of Data Science	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

To introduce the basics of data science.
To enrich the skills in linear algebra models.
To understand the concepts of fitting of curves and regression.
To expose the knowledge optimization techniques in advanced fields.
To impart the knowledge in data science methods.

Pre-requisites

Basic Knowledge of Data science

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyse the concepts of linear algebra in data science problems.	Remember
CO2	Apply the properties, eigen values and eigen vectors based on linear algebra.	Apply
CO3	Solve the real time applications using regression analysis and estimation.	Apply
CO4	Compare the optimization techniques to solve the machine learning.	Apply
CO5	Apply the data science concepts as advanced models.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	2	2	2	-	-	-	1	1	1	3	2	2
CO2	3	2	3	3	1	2	-	-	-	1	1	1	3	2	3
CO3	3	2	1	1	3	2	-	-	-	1	1	1	3	2	3
CO4	3	3	2	3	1	2	-	-	-	1	1	1	3	2	3
CO5	3	3	2	3	1	2	-	-	-	1	1	1	3	2	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	00	00	00
Understand	20	20	20
Apply	40	40	80
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E11 – Mathematical Foundations of Data Science								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to Data science Typology of Problems-Importance of Linear Algebra-Linear Algebra Applications- Statistics and Optimization from a Data Science Perspective- Structured Thinking for Solving Data Science Problems.	[9]
Linear Algebra and Matrices Linear Algebra - Matrices and their Properties (Determinants, Traces, Rank, Nullity, etc.)- Eigenvalues and Eigenvectors- Matrix Factorizations - Inner Products - Distance Measures – Projections - Notion of Hyperplanes – Half - Planes	[9]
Probability and Statistics Probability - Statistics and Random Processes - Probability Theory and Axioms - Random Variables - Probability Distributions and Density Functions - Expectations and Moments - Covariance and Correlation - Statistics and Sampling Distributions - Hypothesis Testing of Means, Proportions, Variances and Correlations - Correlation Functions.	[9]
Optimization Techniques Unconstrained Optimization- Necessary and Sufficiency Conditions for Optima- Gradient Descent Methods- Constrained Optimization, KKT Conditions- Introduction to Non-Gradient Techniques- Introduction to Least Squares Optimization- Optimization View of Machine Learning - Importance of Optimization in Machine Learning.	[9]
Supervised and Unsupervised Learning Introduction to Data Science Methods - Linear Regression as an Exemplar Function Approximation Problem - Linear Classification Problems - Supervised Learning - Unsupervised Learning.	[9]
Total Hours:	**45**

Text Book(s):	
1.	David C. Lay, 'Linear Algebra and its Applications', 5th Edition, Pearson Education, 2014.
2.	B.S. Grewal, 'Higher Engineering Mathematics', 43rdEdition, Khanna Publishers, Delhi, 2014
Reference(s):	
1.	G. Strang . Introduction to Linear Algebra, Wellesley-Cambridge Press, Fifth edition, USA, 2016.
2.	Bendat, J. S. and A. G. Piersol. Random Data: Analysis and Measurement Procedures. 4th Edition. John Wiley & Sons, Inc., NY, USA, 2010
3.	Montgomery, D. C. and G. C. Runger. Applied Statistics and Probability for Engineers. 5th Edition. John Wiley & Sons, Inc., NY, USA, 2011.
4.	David G. Luenberger . Optimization by Vector Space Methods, John Wiley & Sons (NY), 1969.

* SDG: 4 – Quality Education

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Course Contents and Lecture Schedule

S.No.	Topic	No. of Hours
1.0	**Basics of Data Science and Problems**	
1.1	Introduction to Data science	1
1.2	Typology of Problems	1
1.3	Importance of Linear Algebra	1
1.4	Linear Algebra Applications	2
1.5	Statistics and Optimization from a Data Science Perspective	2
1.7	Structured Thinking for Solving Data Science Problems.	2
2.0	**Linear Algebra and Matrices**	
2.1	Linear Algebra	1
2.2	Matrices and their Properties	1
2.3	Eigenvalues and Eigenvectors	1
2.4	Matrix Factorizations	1
2.5	Inner Products	1
2.6	Matrix Factorizations	1
2.7	Distance Measures	1
2.8	Projections	1
2.9	Notion of Hyperplanes - Half-Planes.	1
3.0	**Probability and Statistics**	
3.1	Probability, Statistics and Random Processes	1
3.2	Probability Theory and Axioms	1
3.3	Random Variables	1
3.4	Probability Distributions and Density Functions	1
3.5	Expectations and Moments	1
3.6	Covariance and Correlation	1
3.7	Statistics and Sampling Distributions	1
3.8	Hypothesis Testing	1
3.9	Correlation Functions	1
4.0	**Optimization View of Machine Learning**	
4.1	Unconstrained Optimization	1
4.2	Necessary and Sufficiency Conditions for Optima	1
4.3	Gradient Descent Methods	1
4.4	Constrained Optimization	1
4.5	KKT Conditions	1
4.6	Introduction to Non-Gradient Techniques	1
4.7	Introduction to Least Squares Optimization	1
4.8	Optimization View of Machine Learning	1
4.9	Importance of Optimization in Machine Learning	
5.0	**Introduction to Data Science Methods**	
5.1	Introduction to Data Science Methods	1
5.2	Linear Regression	2
5.3	An Exemplar Function Approximation Problem	2
5.4	Linear Classification Problems	2
5.5	Supervised Learning	1
5.6	Unsupervised Learning	1
	Total	**45**

Course Designer

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60 IT E12/ 60 IT L04	C# and .NET Framework	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To learn basic programming in C#.
- To know the object oriented aspects of C#.
- To be aware of Windows application development in .NET.
- To update and enhance skills in writing Web based applications and ADO.NET.
- To learn CLR and the .NET Framework.

Pre-requisites

- Basic knowledge of any programming language

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyse the basic structure of a C# application	Understand
CO2	Develop C# programs which makes use of inheritance, polymorphism, interfaces and handle exceptions	Apply
CO3	Design windows application and access data with ADO.NET	Apply
CO4	Apply the knowledge of data binding to create Web forms and obtain knowledge of Web services	Apply
CO5	Discuss about assemblies, versioning and explore the activities of marshalling and Remoting	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	2	2	-	-	3	3	2
CO2	3	3	3	3	3	-	-	-	2	2	-	-	3	3	2
CO3	3	3	3	2	2	-	-	-	2	3	3	-	3	3	2
CO4	3	3	3	2	2	-	-	-	2	3	3	-	3	3	2
CO5	3	3	3	2	2	-	-	-	2	3	3	-	3	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	16
Understand	20	20	24
Apply	30	30	40
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech. – Information Technology								
60 IT E12/60 IT L04– C# and .NET Framework								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to C#* Introducing to C#, Overview of C#, Literals, Variables and Data Types, Operators and Expressions, Branching and Looping, Methods, Arrays, Strings, Structures and Enumerations, Boxing and Unboxing.	[9]
Object Oriented Aspects of C#* Class, Objects, Constructors and its Types, Inheritance, Properties, Indexers, Index Overloading, polymorphism, Sealed Class and Methods, Interface, Abstract Class, Operator Overloading, Delegates, Events, Errors and Exception, Threading.	[9]
Window Based Application Development on .NET* Understanding .NET - Building Windows Applications - Creating a Simple Windows Forms, Creating a Windows Forms Application, XML Documentation Comments. Accessing Data with ADO.NET, Relational Databases and SQL, ADO .NET Object Model, Using OLE DB Managed Providers and Working with Data- Bound Controls.	[9]
Web Based Application Development on .NET* Understanding Web Forms - Creating a Web Forms - Adding Controls - Data Binding, Web Services - SOAP, WSDL and Discovery - Building a Web Service - Passing Datasets, Returning Datasets from Web Services, Creating the Proxy - Session and Cache management.	[9]
The CLR and The .NET Framework* Assemblies, Versioning, Attributes, Reflection, Viewing Meta Data, Type discovery, Reflection on Type, Marshalling, Remoting, Security in .NET.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Mark.J.Price," C# 11 and .NET 7 – Modern Cross-Platform Development", 7th Edition, Packt Publishing, 2022
2.	Mark Reed ,"C#: The Ultimate Beginners Guide to Learn C# Programming Step-by-Step (Computer Programming)", Kindle Edition,2021
Reference(s):	
1.	"C# in Depth", Manning Publisher, 4th Edition,2019
2.	Harsh Bhasin, "Programming in C#", Oxford University Press, 2014.
3.	Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India,2012
4.	Herbert Schildt, "The Complete Reference: C# 4.0", Tata Mc Graw Hill,2012.

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to C#**	
1.1	Introducing C#	1
1.2	Overview of C# - Literals, Variables and Data Types	1
1.3	Operators and Expressions	1
1.4	Branching and Looping	1
1.5	Methods	1
1.6	Strings	1
1.7	Structures and Enumerations	2
1.8	Boxing and Unboxing	1
2.0	**Object Oriented Aspects of C#**	
2.1	Class, Objects	1
2.2	Constructors and its Types	1
2.3	Inheritance, Properties	1
2.4	Indexers, Index Overloading	1
2.5	Polymorphism, Sealed Class and Methods	2
2.6	Operator Overloading, Delegates, Events	1
2.7	Errors and Exception	1
2.8	Threading	1
3.0	**Window Based Application Development on .NET**	
3.1	Understanding .NET - Building Windows Applications	1
3.2	Creating a Simple Windows Forms	1
3.3	Creating a Windows Forms Application	1
3.4	XML Documentation Comments	1
3.5	Accessing Data with ADO.NET	1
3.6	Relational Databases and SQL	1
3.7	ADO .NET Object Model	1
3.8	Using OLE DB Managed Providers and Working with Data	1
3.9	Bound Controls	1
4.0	**Web Based Application Development on .Net**	
4.1	Understanding Web Forms - Creating a Web Forms	1
4.2	Adding Controls	1
4.3	Data Binding	1
4.4	Web Services - SOAP	1
4.5	WSDL and Discovery - Building a Web Service	1
4.6	Passing Datasets- Returning Datasets from Web Services	1
4.7	Creating the Proxy	1
4.8	Session and Cache management	1
5.0	**The CLR and The .NET Framework**	
5.1	Assemblies, Versioning	1
5.2	Attributes, Reflection	1
5.3	Viewing Meta Data	1
5.4	Type Discovery	1
5.5	Reflection on Type	1
5.6	Marshalling	1
5.7	Remoting	1
5.8	Security in .NET	1

Course Designer(s)

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60 IT E13	Telecommunication Systems	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the basics of analog modulation.
- To impart the knowledge about the pulse modulation techniques.
- To learn about the different digital modulation techniques.
- To recognize the various antennas used in communication.
- To explore the stages involved in satellite communication.

Pre-requisites

- Basic knowledge of Electrical and Electronics Engineering.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Discuss the basic principles of analog modulation techniques.	Understand
CO2	Describe the various pulse modulation techniques.	Understand
CO3	Comprehend the choice of different digital modulation techniques.	Apply
CO4	Examine the characteristics of different antennas and the application of microwaves in communication.	Apply
CO5	Identify the role of Satellite subsystems and Ground stations.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	1	1	-	-	-	-	1	1	-	1	-	-	2
CO2	2	2	1	1	-	-	-	-	1	1	-	1	-	-	2
CO3	2	2	1	1	-	-	-	-	1	1	-	1	-	-	2
CO4	2	2	1	1	-	-	-	-	1	1	-	1	-	-	2
CO5	2	2	1	1	-	-	-	-	1	1	-	1	-	-	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	30	30
Apply	-	10	20
Analyse	-	-	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E13 - Telecommunication Systems								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Analog Communication Elements of Electronic Communications System - Analog and Digital Transmission- Modulation - Types of Analog Modulation- Principles of Amplitude Modulation: AM for a Complex Modulating Signal, AM Power and Current distribution - Principles of Angle Modulation - Theory of FM, Spectrum Analysis of FM - Theory of PM: Relationship between FM and PM	[9]
Pulse Modulation Techniques Digital versus Analog Transmissions - Classification of Pulse Modulation Techniques - Pulse Amplitude Modulation - Pulse Width Modulation - Pulse Position Modulation - Pulse Code Modulation - Differential PCM - Delta Modulation	[9]
Digital Communication Types of Digital Modulation - Amplitude Shift Keying - Frequency Shift Keying - Phase Shift Keying - Quadrature Phase Shift Keying - Minimum Shift Keying - Choice of Digital Modulation Techniques	[9]
Antennas and Wave Propagation * Antenna fundamentals - Common Antenna Types – Radio Wave Propagation – Microwave Concepts - Microwave Antennas – Microwave Applications – Radar principles	[9]
Satellite Communication * Satellite Orbits – Kepler's Laws- Satellite Communication Systems – Satellite Subsystems – Ground Stations – Satellite Applications – Global Positioning System	[9]
Total Hours:	**45**

Text Book(s):	
1.	Singal T.L., "Analog and Digital Communications", 1st edition, Mc Graw Hill Education (India), 2012.
2.	Louis E. Frenzel, "Principles of Electronic Communication Systems", 3rd Edition, Tata Mc Graw Hill, NewDelhi, 2017.
Reference(s):	
1.	Simon Haykin, Michael Moher, Ajay Singh Raghuvanshi, Shweta Shah, "Communication Systems, 5th Edition, Wiley, 2022.
2.	Herbert Taub, Donald L Schilling ,Goutam Saha ,"Principles of Communication Systems", 4th edition, Mc Graw Hill Education,2014.
3.	George Kennedy, Bernard Davis, Prasanna S.R.M,, "Electronic Communication Systems", 5th edition, Mc Graw Hill Education, 2015.
4.	Wayne Tomasi, "Electronic Communication Systems Fundamentals through advanced", 5th edition, Pearson Education, 2009.

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Analog Communication**	
1.1	Elements of Electronic Communications System	1
1.2	Analog and Digital Transmission	1
1.3	Modulation - Types of Analog Modulation	1
1.4	Principles of Amplitude Modulation: AM for a Complex Modulating Signal	1
1.5	AM Power and Current distribution	1
1.6	Principles of Angle Modulation - Theory of FM	1
1.7	Spectrum Analysis of FM	1
1.8	Theory of PM	1
1.9	Relationship between FM and PM	1
2.0	**Pulse Modulation Techniques**	
2.1	Digital versus Analog Transmissions	1
2.2	Classification of Pulse Modulation Techniques	1
2.3	Pulse Amplitude Modulation	1
2.4	Pulse Width Modulation	1
2.5	Pulse Position Modulation	1
2.6	Pulse Code Modulation	2
2.7	Differential PCM	1
2.8	Delta Modulation	1
3.0	**Digital Communication**	
3.1	Types of Digital Modulation	1
3.2	Amplitude Shift Keying	1
3.3	Frequency Shift Keying	1
3.4	Phase Shift Keying	1
3.5	Quadrature Phase Shift Keying	2
3.6	Minimum Shift Keying	1
3.7	Choice of Digital Modulation Techniques	2
4.0	**Antennas and Wave Propagation**	
4.1	Antenna fundamentals	1
4.2	Common Antenna Types	2
4.3	Radio Wave Propagation	1
4.4	Microwave Concepts	1
4.5	Microwave Antennas	2
4.6	Microwave Applications	1
4.7	Radar principles	1
5.0	**Satellite Communication**	
5.1	Satellite Orbits	1
5.2	Kepler's Laws	1
5.3	Satellite Communication Systems	1
5.4	Satellite Subsystems	2
5.5	Ground Stations	1
5.6	Satellite Applications	2
5.7	Global Positioning System	1

Course Designer(s)

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60 IT E14	Bioinformatics	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To Understand scope and components of Bioinformatics technologies
- To understand data warehouse concepts, architecture and tools
- To understand data pre-processing and data visualization techniques
- To understand and apply various classification and clustering techniques using tools.
- To study algorithms for finding hidden and interesting patterns in data

Pre-requisites

- Basic knowledge of mathematics and programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the scope and various components of Bioinformatics technologies.	Understand
CO2	Understand data warehouse concepts, architecture and tools.	Understand
CO3	Understand data pre-processing and data visualization techniques.	Apply
CO4	Apply various classification and clustering techniques using tools.	Analyse
CO5	Understand algorithms for finding hidden and interesting patterns in data.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	3	3	3	3	-	-	3	2	3
CO2	3	2	3	2	3	3	3	2	3	3	-	-	2	3	3
CO3	3	3	3	2	3	3	2	3	-	-	-	-	3	3	3
CO4	3	3	3	3	3	3	3	-	3	-	-	-	2	2	2
CO5	3	3	3	3	3	-	3	-	-	-	-	-	3	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	10	30
Understand	30	20	60
Apply	-	20	10
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E14 – Bioinformatics								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction Need for Bioinformatics technologies – Overview of Bioinformatics technologies Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.	[9]
Data Warehousing and Data Mining Bioinformatics Data – Data Warehousing Architecture – Data Quality – Biomedical data analysis – DNA Data Analysis – Protein Data Analysis – Machine learning – Neural Network Architecture and Applications in Bioinformatics.	[9]
Modeling Hidden Markov Modeling for Biological Data Analysis – Sequence Identification - Sequence Classification - Multiple Alignment Generation - Comparative Modeling - Protein Modeling - Bayesian Networks - Computer Programs for Molecular Modeling.	[9]
Pattern Matching And Visualization Gene Regulation - Motif Recognition - Motif Detection - Strategies for Motif Detection - Visualization - Fractal Analysis - DNA Walk Models - One Dimension - Two Dimension - Higher Dimension - Game Representation of Biological Sequences - DNA, Protein, Amino Acid Sequences.	[9]
Microarray Analysis Microarray Technology for Genome Expression Study - Image Analysis for Data Extraction - Preprocessing - Segmentation - Gridding - Spot Extraction - Normalization, Filtering - Cluster Analysis - Gene Network Analysis - Compared Evaluation of Scientific Data Management Systems - Cost Matrix - Evaluation Model - Benchmark - Tradeoffs.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Namita Mendiratta, Parag Rastogi,S.C. Rastogi, “Bioinformatics: Methods and Applications” PHI Learning, 30 Sep 2022.
2.	Gladis Hepsyba Helen S,” Basic Bioinformatics”, MJp Publisher, July 2021.
Reference(s):	
1.	Neil J. Jones, Pavel A. Pevzner, “Introduction to Bioinformatics Algorithms”, ANE Books, Dec 2009.
2.	Yi-ping Phoebe Chen (Ed),”Bioinformatics Technologies”, 2nd Indian Reprint, 2014
3.	Lesh, “Introduction to Bioinformatics”, 4th Revised ed. Oxford University Press, Nov 2014
4.	Arunima Mukerjee, “Bioinformatics”, Oxford Book Company, Aug 2009

***** SDG-4 – Quality Education

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Course Contents and Lecture Schedule

S. No	Topic	No. of Hours
1.0	**Introduction**	
1.1	Need for Bioinformatics technologies	1
1.2	Overview of Bioinformatics technologies Structural bioinformatics	2
1.3	Data format and processing	1
1.4	Secondary resources and applications	1
1.5	Role of Structural bioinformatics	1
1.7	Biological Data Integration System	2
2.0	**Data Warehousing and Data Mining**	
2.1	Bioinformatics Data	1
2.2	Data Warehousing Architecture	1
2.3	Data Quality	1
2.4	Biomedical data analysis	1
2.5	DNA Data Analysis	1
2.6	Protein Data Analysis	1
2.7	Machine learning	1
2.8	Neural Network Architecture	1
2.9	Applications in Bioinformatics	1
3.0	**Modeling**	
3.1	Hidden Markov Modeling for Biological Data Analysis	1
3.2	Sequence Identification	1
3.3	Sequence Classification	1
3.4	Multiple Alignment Generation	1
3.5	Comparative Modeling	1
3.6	Protein Modeling	1
3.7	Bayesian Networks	1
3.8	Computer Programs for Molecular Modeling	2
4.0	**Pattern Matching And Visualization**	
4.1	Gene Regulation	1
4.2	Motif Recognition	1
4.3	Motif Detection , Strategies for Motif Detection	1
4.4	Visualization	1
4.5	Fractal Analysis	1
4.6	DNA Walk Models	1
4.7	One Dimension - Two Dimension - Higher Dimension	1
4.8	Game Representation of Biological Sequences	1
4.9	DNA, Protein, Amino Acid Sequences	1
5.0	**Microarray Analysis**	
5.1	Microarray Technology for Genome Expression Study	1
5.2	Image Analysis for Data Extraction	1
5.3	Preprocessing	1
5.4	Segmentation , Gridding ,Spot Extraction	1
5.5	Normalization, Filtering	1
5.6	Cluster Analysis	1
5.7	Gene Network Analysis	1
5.8	Compared Evaluation of Scientific Data Management Systems	1
5.9	Cost Matrix - Evaluation Model - Benchmark - Tradeoffs.	1

Course Designer

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60 IT E15	Information Security	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

Pre-requisites

- Basic Knowledge of Information Technology.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Discuss the basics of information security.	Understand
CO2	Illustrate the legal, ethical and professional issues in information security.	Apply
CO3	Demonstrate the aspects of risk management.	Apply
CO4	Become aware of various standards in the Information Security System.	Understand
CO5	Design and implementation of Security Techniques.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	20	30	50
Apply	20	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech– Information Technology								
60 IT E15 - Information Security								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction History of Information Security- Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC	[9]
Security Investigation Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies	[9]
Security Analysis Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk - Systems: Access Control Mechanisms, Information Flow and Confinement Problem	[9]
Logical Design Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity	[9]
Physical Design Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel	[9]
Total Hours:	**45**

Text Book(s):	
1.	Michael E Whitman and Herbert J Mattord, ”Principles of Information Security‖, Vikas Publishing House”, New Delhi, 2023
2.	Micki Krause, Harold F. Tipton, ”Handbook of Information Security Management‖”, Vol 1-3 CRCPress LLC, 2023.
Reference(s):	
1.	Stuart McClure, Joel Scrambray, George Kurtz, “Hacking Exposed‖”, Tata McGraw- Hill, 2023
2.	Matt Bishop, “Computer Security Art and Science‖”, Pearson/PHI, 2023.

* SDG4 – Quality Education

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Course Contents and Lecture Schedule		
S. No	**Topic**	**No. of Hours**
1.0	**Introduction**	
1.1	History	1
1.2	Information Security	1
1.3	Critical Characteristics of Information	1
1.4	NSTISSC Security Model	1
1.5	Components of an Information System	1
1.7	Securing the Components	1
1.8	Balancing Security and Access	1
1.9	The SDLC	1
2.0	**Security Investigation**	
2.1	Need for Security	1
2.2	Business Needs	1
2.3	Threats, Attacks	1
2.4	Legal, Ethical and Professional Issues	1
2.5	An Overview of Computer Security	1
2.6	Access Control Matrix	1
2.7	Policy-Security Policies	1
2.8	Confidentiality Policies	1
2.9	Integrity Policies and Hybrid Policies	1
3.0	**Security Analysis**	
3.1	Risk Management	1
3.2	Identifying Risk	1
3.3	Assessing Risk	1
3.4	Controlling Risk	1
3.5	Access Control Mechanisms	1
3.6	Access Control Mechanisms	1
3.7	Information Flow and Confinement Problem	3
4.0	**Logical Design**	
4.1	Blueprint for Security	1
4.2	Information Security Policy	1
4.3	Standards and Practices	1
4.4	ISO 17799	1
4.5	BS 7799	1
4.6	Design of Security Architecture	1
4.7	Planning for Continuity	1
4.8	NIST Models	2
5.0	**Physical Design**	
5.1	Security Technology	1
5.2	IDS	1
5.3	Scanning and Analysis Tools	1
5.4	Cryptography	1
5.5	Access Control Devices	2
5.6	Physical Security	1
5.7	Security and Personnel	2
	Total	45

Course Designer

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60 IT E16	Compiler Design	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the different phases of compiler.
- To inspect the various parsing techniques.
- To interpret the Intermediate code generation and run-time environment.
- To design the front-back end of the compiler.
- To perceive the implementation of code generator.

Pre-requisites

- Basic knowledge of mathematics and programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Predict the phases of compiler	Apply
CO2	Apply different parsing algorithms to develop the parsers for a given grammar	Apply
CO3	Perform syntax-directed translation with intermediate language	Apply
CO4	Analyse the environment for storage of generated intermediate code	Analyse
CO5	Develop the optimized code generator	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	3	2	2	3	3	2	2	3	3	3	3
CO2	3	3	3	2	3	-	2	3	3	2	3	3	3	3	3
CO3	3	3	3	3	3	-	-	3	2	-	3	2	3	3	3
CO4	3	2	3	3	3	-	-	3	3	-	3	2	-	3	3
CO5	3	2	3	3	2	-	-	3	3	-	2	2	-	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	20	20	40
Apply	20	10	20
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech - Information Technology								
60 IT E16 – Compiler Design								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to Compilers Introduction to Compiler - Structure of a Compiler - Lexical Analysis - Role of Lexical Analyser - Input Buffering - Specification of Tokens - Recognition of Tokens - Lex - Finite Automata - Regular Expressions to Automata - Minimizing DFA - Compiler Construction Tools.	[9]
Syntax Analysis Role of Parser - Grammars - Error Handling - Context-free grammars - Writing a grammar - Top Down Parsing - Predictive Parser - LL(1) Parser - Shift Reduce Parser-LR Parser - LR (0)Item Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyser -YACC.	[9]
Intermediate Code Generation** Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.	[9]
Run-Time Environment and Code Generation Storage Organization, Stack Allocation Space, Access to Non - local Data on the Stack, Heap Management - Issues in Code Generation - Design of a simple Code Generator.	[9]
Code Optimization* Principal Sources of Optimization - Peep-hole optimization – DAG - Optimization of Basic Blocks - Global Data Flow Analysis - Efficient Data Flow Algorithm.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers Principles, Techniques and Tools”, Pearson Education Asia, 2016.
2.	Dhamdhere, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2012.
Reference(s):	
1.	Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS Publications, 2005.
2.	C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003.
3.	Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001.
4.	Kenneth C. Louden, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003.

****** SDG-4 – Quality Education

***** SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction To Compilers**	
1.1	Introduction to Compiler - Structure of a Compiler	1
1.2	Lexical Analysis - Role of Lexical Analyser	1
1.3	Input Buffering	1
1.4	Specification of Tokens - Recognition of Tokens	1
1.5	Lex	1
1.6	Finite Automata - Regular Expressions to Automata	2
1.7	Minimizing DFA	1
1.8	Compiler Construction Tools	1
2.0	**Syntax Analysis**	
2.1	Role of Parser	1
2.2	Grammars - Error Handling - Context-Free Grammars	1
2.3	Writing a Grammar - Top Down Parsing	1
2.4	Predictive Parser	1
2.5	LL(1) Parser-Shift Reduce Parser - LR Parser	1
2.6	LR (0)Item Construction of SLR Parsing Table	1
2.7	LR (0)Item Construction of CLR Parsing Table	1
2.8	Introduction to LALR Parser	1
2.9	Error Handling and Recovery in Syntax Analyser-YACC	1
3.0	**Intermediate Code Generation**	
3.1	Syntax Directed Definitions	1
3.2	Evaluation Orders for Syntax Directed Definitions	1
3.3	Intermediate Languages : Syntax Tree	1
3.4	Three Address Code	2
3.5	Types and Declarations	1
3.6	Translation of Expressions	1
3.7	Type Checking	1
4.0	**Run-Time Environment and Code Generation**	
4.1	Storage Organization	1
4.2	Stack Allocation Space	1
4.3	Access to Non-local Data on the Stack	1
4.4	Heap Management	1
4.5	Issues in Code Generation	1
4.6	Design of a Simple Code Generator	1
5.0	**Code Optimization**	
5.1	Principal Sources of Optimization	1
5.2	Peep-Hole Optimization	1
5.3	DAG	1
5.4	Optimization of Basic Blocks	2
5.5	Global Data Flow Analysis	1
5.6	Efficient Data Flow Algorithm	2
	Total	45

Course Designer(s)

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60 CS E16	Industrial Cloud Practices	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Equip participants with a comprehensive understanding of cloud computing principles, AWS services, and security fundamentals to confidently initiate their cloud journey
- Enable participants to grasp fundamental concepts of cloud-based compute resources, specifically focusing on Amazon Elastic Compute Cloud (Amazon EC2) and related services, including containerization and orchestration, fostering a solid foundation for practical application
- Provide a concise understanding of OSI model layers, foundational AWS networking and security services, and proactive vulnerability prevention within the AWS cloud environment
- Immerse learners in the realm of AWS storage solutions, covering the diverse offerings of block storage, object storage, and database services, while facilitating practical skills in hosting websites through Amazon S3
- Equip participants with a comprehensive understanding of AWS monitoring and cost management tools, specifically focusing on CloudTrail, CloudWatch, and effective cloud cost optimization strategies

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Possess a clear grasp of cloud computing concepts, the advantages of cloud adoption, the significance of AWS, and the foundational knowledge to utilize key AWS services effectively, while also demonstrating an understanding of cloud security essentials and initial steps to set up an AWS account and explore its service offerings.	Understand
CO2	Understand the benefits of Amazon EC2 and its various instance types, distinguishing among billing options, comprehending dynamic scaling through features like Amazon EC2 Auto Scaling and Elastic Load Balancing, grasping containerization history and technologies, explaining AWS container offerings like Fargate and Amazon EKS, and practically creating an EC2 instance using a t2.micro instance type.	Understand
CO3	Gain the knowledge of OSI model's structure, AWS networking services including subnetting, Virtual Private Cloud (VPC), security essentials like Security Groups and Network Access Control Lists (NACLs), AWS's comprehensive security measures and global infrastructure, strategies to prevent and detect vulnerabilities, and practical skills to create a VPC with multiple subnets across different availability zones.	Understand
CO4	Understand the Amazon Elastic Block Store (EBS) and its volume types, performance distinctions, and EC2 instance store applications. They will also be adept in comprehending Amazon S3's object storage services, storage classes, tiering options, data protection, AWS database options including RDBMS and NoSQL (DynamoDB), and will have the practical ability to create an S3 bucket and host a static website.	Understand

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CO5	Understand CloudTrail operations, application scenarios, cost structures, and benefits. They will also gain an understanding of Amazon CloudWatch, CloudWatch Logs, and Log Insights, along with the ability to query logs from CloudWatch Logs. Additionally, participants will become proficient in cloud financial management, cost optimization considerations, and practical skills such as sending CloudTrail logs to CloudWatch, running Log Insights queries, and validating their results.	Understand

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	2	-	-	-	-	-	2	-	-	-	-	-
CO2	3	2	3	2	-	-	-	-	-	2	-	2	2	-	-
CO3	3	2	3	2	2	-	-	-	3	2	-	-	-	3	-
CO4	3	3	3	2	-	-	-	-	-	2	-	-	-	3	-
CO5	3	3	2	2	2	-	-	-	3	2	-	2	2	3	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	20	20	34	34
Understand	40	40	66	66
Apply	-	-	-	-
Analyse	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech - Information Technology								
60 CS E16- Industrial Cloud Practices								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Overview of Cloud Computing*: Exploring the Concept of Cloud Computing, Understanding the Benefits of Cloud Adoption - Selecting AWS: Reasons and Advantages - Initiating Your Journey: Getting Started with Cloud and AWS - **Introduction to AWS:** Getting Started in the AWS Cloud, Understanding the AWS Global Infrastructure - **Core Services Part I:** Explore AWS Cloud Computing Fundamentals, Delve into AWS Cloud Storage Essentials, Gain Insight into AWS Cloud Database Services - **Core Services Part II:** Understand Networking in Core AWS Services, Explore Security Aspects in Core AWS Services, Grasp Pricing Essentials of Core AWS Services - **Security Basics:** Identity and Access Management**.** **Case Study: A Kick Start - Cloud Journey:** Open AWS Cloud Account - Review the Services Offerings from Compute, Storage, Database, Networking, Security.	[9]
Compute in the Cloud*: Benefits of Amazon Elastic Compute Cloud (Amazon EC2) at a basic level, Identify the different Amazon EC2 instance types, Differentiate between the various billing options for Amazon EC2, Benefits of Amazon EC2 Auto Scaling - **Dynamic Scaling and Hosting in the Cloud:** Summarize the benefits of Elastic Load Balancing, Give an example of the uses for Elastic Load Balancing, Summarize additional AWS compute options - **Learn Container Concepts:** History of Containerization, Container Technologies, Microservices and Management - **Learn AWS Container Offerings:** Explain the functioning of Fargate, What is Container Orchestration Environment, Learn the fundamentals of AWS EKS. **Case Study:** Create EC2 Instance - t2. Micro.	[9]
Introduction to OSI Layer*: OSI Model Overview, Physical and Data Link Layers, Network and Transport Layers Session, Presentation, and Application Layers - **AWS Networking Services Fundamentals:** Learn the concept of Subnetting, Amazon Virtual Private Cloud, Security Group, NACL - **AWS Security Services Fundamentals:** Cloud Security Measures, The Worldwide Infrastructure of AWS, Ensuring Data Center Security, Adhering to Compliance and Governance, Countering DDoS Attacks - **Prevention and Detection Vulenarabities in AWS Cloud:** Introduction to AWS Entry Points, Identity and Access Management in AWS, Exploring Detective Controls, Securing Infrastructure in Cloud, Ensuring Data Protection in AWS, Incident Response Strategies in Cloud Environment. **Case Study:** Create a VPC and 2 Subnets in Different Availability Zone.	[9]
AWS Block Storage*: Amazon EBS Block Storage Service, Amazon EBS Volume Types, Performance Differentiation of Amazon EBS Volume Types, Uses for Amazon EC2 Instance Stores, Retention Options for EBS Volumes - **AWS Object Storage Basic:** Amazon S3 Object Storage Services, Amazon S3 Storage Classes Distinguishing Amazon S3 Glacier Storage Classes, Storage Class Data Tiering Options, Data Protection for Amazon S3 - **AWS Database offerings – RDBMS:** Discerning Among AWS Database Options, Exploring Amazon Relational Database Service (RDS) Value, Unveiling Amazon Aurora Architecture, Achieving High Performance with Amazon Aurora - **AWS Database offerings - NoSQL – DynamoDB:** What is NoSQL and why we need it, Amazon DynamoDB Fundamentals, Terminology and Technology Concepts. **Case Study: Host Website in S3 Bucket:** Create a S3 Bucket and Host a Static Website.	[9]

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Learn the CloudTrail*: CloudTrail Operation Understanding, Surveying CloudTrail Application Scenarios, CloudTrail Cost Structure Explanation, Recognizing CloudTrail Advantages - **Understand the Cloudwatch, Cloudwatch Logs and Log Insights:** Introduction to Amazon CloudWatch, Log files from Amazon Elastic Compute Cloud (Amazon EC2) instances, AWS CloudTrail, Query the logs from Cloudwatch Logs - **Cloud Cost Management:** Understand Cloud Financial Management, Six capabilities to have to be successful in your Cloud Financial Management journey - **Cost Optimization:** Cloud Usage with Cost Consideration, Enhance Cloud Utilization, Purchase Choices Based on Commitment. **Case Study: Explore CloudTrail and CloudWatch:** Send the Logs from CloudTrail to Cloudwatch, Run LogInsights query and Validate it.	[9]
Total Hours:	**45**

Text Book(s):

1. https://www.amazon.in/-/hi/Neal-Davis/dp/1073015513
2. https://www.amazon.in/Certified-Cloud-Practitioner-CLF-C01-Pearson/dp/9353945364

Reference(s):

1. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/15120/cloud-for-ceos
2. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/15009/getting-started-with- aws-cloud-essentials
3. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/454/aws-identity-and- access management-basics
4. https://explore.skillbuilder.aws/learn/learning_plan/view/82/cloud-essentials-learning-plan- earn-a learning-badge
5. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/2486/introduction-to- container-concepts
6. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/13380/getting-started-with- aws fargate
7. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/12439/aws-networking- basics
8. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/4791/differences-between security-groups-and-nacls"
9. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/193/getting-started-with- aws-cloudtrail
10. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/203/introduction-to- amazon cloudwatch
11. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/191/introduction-to- amazon cloudwatch-logs
12. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/265/introduction-to- amazon cloudwatch-logs-insights"
13. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/1955/aws-foundations-cost management
14. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/10803/aws-cloud-for-finance-professionals
15. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/16650/aws-block-storage-services-getting-started
16. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/16651/aws-object-storage services-getting-started
17. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/1383/aws-database- services navigate-technical
18. https://explore.skillbuilder.aws/learn/course/internal/view/elearning/324/amazon-dynamodb-service-primer

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Overview of Cloud Computing**	
1.1	Exploring the Concept of Cloud Computing, Understanding the Benefits of Cloud Adoption	1
1.2	Selecting AWS: Reasons and Advantages	1
1.3	Initiating Your Journey: Getting Started with Cloud and AWS	1
1.4	Introduction to AWS: Getting Started in the AWS Cloud, Understanding the AWS Global Infrastructure	1
1.5	Core Services Part I: Explore AWS Cloud Computing Fundamentals, Delve into AWS Cloud Storage Essentials, Gain Insight into AWS Cloud Database Services	1
1.6	Core Services Part II: Understand Networking in Core AWS Services, Explore Security Aspects in Core AWS Services, Grasp Pricing Essentials of Core AWS Services	1
1.7	Security Basics: Identity and Access Management**.**	1
1.8	Case Study: A Kick Start - Cloud Journey: Open AWS Cloud Account	1
1.9	Review the Services Offerings from Compute, Storage, Database, Networking, and Security.	1
2.0	**Compute in the Cloud**	
2.1	Benefits of Amazon Elastic Compute Cloud (Amazon EC2) at a basic level, Identify the different Amazon EC2 instance types, Differentiate between the various billing options for Amazon EC2, Benefits of Amazon EC2 Auto Scaling	2
2.2	Dynamic Scaling and Hosting in the Cloud**:** Summarize the benefits of Elastic Load Balancing, Give an example of the uses for Elastic Load Balancing, Summarize additional AWS compute options	2
2.3	Learn Container Concepts: History of Containerization, Container Technologies, Micro services and Management	2
2.4	Learn AWS Container Offerings: Explain the functioning of Fargate, What is Container Orchestration Environment, Learn the fundamentals of AWS EKS.	2
2.5	Case Study: Create EC2 Instance - t2. Micro	1
3.0	**Introduction to OSI Layer**	
3.1	OSI Model Overview, Physical and Data Link Layers, Network and Transport Layers Session, Presentation, and Application Layers	2
3.2	AWS Networking Services Fundamentals: Learn the concept of Subnetting, Amazon Virtual Private Cloud, Security Group, NACL	1
3.3	AWS Security Services Fundamentals: Cloud Security Measures, The Worldwide Infrastructure of AWS, Ensuring Data Center Security, Adhering to Compliance and Governance, Countering DDoS Attacks	2
3.4	Prevention and Detection Vulenarabities in AWS Cloud: Introduction to AWS Entry Points, Identity and Access Management in AWS, Exploring Detective Controls, Securing Infrastructure in Cloud, Ensuring Data Protection in AWS, Incident Response Strategies in Cloud Environment	2
3.5	Case Study: Create a VPC and 2 Subnets in Different Availability Zone	2
4.0	**AWS Block Storage**	
4.1	Amazon EBS Block Storage Service, Amazon EBS Volume Types, Performance Differentiation of Amazon EBS Volume Types, Uses for Amazon EC2 Instance Stores, Retention Options for EBS Volumes.	2
4.2	AWS Object Storage Basic: Amazon S3 Object Storage Services, Amazon S3 Storage Classes Distinguishing Amazon S3 Glacier Storage Classes, Storage Class Data Tiering Options, Data Protection for Amazon S3	2

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4.3	AWS Database offerings – RDBMS: Discerning Among AWS Database Options, Exploring Amazon Relational Database Service (RDS) Value, Unveiling Amazon Aurora Architecture, Achieving High Performance with Amazon Aurora.	1
4.4	AWS Database offerings - NoSQL – DynamoDB**:** What is NoSQL and why we need it, Amazon DynamoDB Fundamentals, Terminology and Technology Concepts.	2
4.5	Case Study: Host Website in S3 Bucket**:** Create a S3 Bucket and Host a Static Website	2
5.0	**Learn the CloudTrail**	
5.1	CloudTrail Operation Understanding, Surveying CloudTrail Application Scenarios, CloudTrail Cost Structure Explanation, Recognizing CloudTrail Advantages.	2
5.2	Understand the Cloudwatch, Cloudwatch Logs and Log Insights: Introduction to Amazon CloudWatch, Log files from Amazon Elastic Compute Cloud (Amazon EC2) instances, AWS CloudTrail, Query the logs from Cloudwatch Logs.	2
5.3	Cloud Cost Management: Understand Cloud Financial Management, Six capabilities to have to be successful in your Cloud Financial Management journey.	2
5.4	Optimization: Cloud Usage with Cost Consideration, Enhance Cloud Utilization, Purchase Choices Based on Commitment.	2
5.5	Case Study: Explore CloudTrail and CloudWatch: Send the Logs from CloudTrail to Cloudwatch, Run LogInsights query and Validate it	1

Course Designer(s)

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60 CS E17	DevOps	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Understand the concept of DevOps
- Understand the Continuous Integration in Automated Testing and Reporting
- Explore Configuration Management, Continuous Delivery and Deployment
- Know the concept of Containerization and Orchestration
- Analyse the Security and Compliance

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recognize the concept of DevOps	Remember
CO2	Apply Continuous Integration in Automated Testing and Reporting	Apply
CO3	Analyse Configuration Management, Continuous Delivery and Deployment	Analyse
CO4	Understand the Containerization and Orchestration	Understand
CO5	Evaluate the Security and Compliance	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	2	-	-	-	2	2	-	2	-	3	-
CO2	3	3	3	-	3	3	-	2	2	2	-	2	2	3	-
CO3	3	3	3	3	3	2	-	2	2	2	-	2	2	3	-
CO4	3	3	2	2	3	3	-	2	2	2	-	2	2	3	-
CO5	3	3	3	-	3	-	-	-	2	2	-	3	2	3	-
3 – Strong; 2 – Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	20	30
Analyse	-	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech - Information Technology

60 CS E17- DevOps

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to DevOps: What is DevOps? - Benefits of DevOps - DevOps Principles - DevOps Culture and Collaboration. **Version Control and Collaboration Tools:** - Introduction to Version Control (Git) - Git Basics: Clone, Commit, Push, Pull - Branching and Merging - Collaborative Development with Git - Introduction to Git Hub/ Git Lab/ Bi bucket.	[9]
Continuous Integration (CI) CI/CD Pipeline Overview - Building and Testing Code Automatically - Introduction to Jenkins or other CI tools - Configuring Jenkins Jobs - Integration with Version Control - Automated Testing and Reporting.	[8]
Configuration Management Infrastructure as Code (IaC) concepts - Introduction to Configuration Management Tools (e.g., Ansible) - Creating Playbooks/Roles for Automated Deployment - Managing Configuration Drift. **Continuous Delivery and Deployment** Understanding Continuous Delivery vs. Continuous Deployment - Blue-Green Deployments - Canary Deployments - Release Orchestration.	[10]
Containerization and Orchestration Introduction to Containers (Docker) - Creating Docker Images - Container Registries (Docker Hub, AWS ECR) - Introduction to Kubernetes - Deploying Containers with Kubernetes **Monitoring and Logging** Importance of Monitoring and Observability - Monitoring Tools (Prometheus, Grafana) - Application Logging and Log Management.	[10]
Security and Compliance Security Principles in DevOps - Incorporating Security in CI/CD - Compliance and Auditing in DevOps. **Cloud Services and DevOps** Cloud Computing Overview - Infrastructure Automation in the Cloud - Serverless Architectures. **DevOps Best Practices and Case Studies** Industry Best Practices - Case Studies of Successful DevOps Implementations.	[8]
Hands On: - Applying DevOps Concepts to a Sample Project. - Setting Up a CI/CD Pipeline. - Deploying and Monitoring the Application.	
Total Hours:	**45**

Text Book(s):

1. Gene Kim, Patrick Debois, John Willis, “The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations”, IT Revolution Press; Illustrated edition, October 6, 2016.
2. Mikael Krief, “Learning DevOps: A comprehensive guide to accelerating DevOps culture adoption with Terraform, Azure DevOps, Kubernetes, and Jenkins”, Packt Publishing; 2nd ed. Edition, March 31, 2022.

Reference(s):

1. Emily Freeman, “DevOps For Dummies”, For Dummies; 1st edition, August 20, 2019.
2. Gaurav Agarwal, “Modern DevOps Practices: Implement and secure DevOps in the public cloud with cutting-edge tools, tips, tricks, and techniques”, Packt Publishing, September 13, 2021.
3. Martyn Coupland, “DevOps Adoption Strategies: Principles, Processes, Tools, and Trends: Embracing DevOps through effective culture, people, and processes”, Packt Publishing, July 9, 2021.
4. Christopher Cowell, Nicholas Lotz, Chris Timberlake, “Automating DevOps with GitLab CI/CD Pipelines: Build efficient CI/CD pipelines to verify, secure, and deploy your code using real-life examples”, Packt Publishing, February 24, 2023.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to DevOps**	
1.1	What is DevOps? - Benefits of DevOps	1
1.2	DevOps Principles	1
1.3	DevOps Culture and Collaboration	1
1.4	Version Control and Collaboration Tools	1
1.5	Introduction to Version Control (Git	1
1.6	Git Basics: Clone, Commit, Push, Pull	1
1.7	Branching and Merging	1
1.8	Collaborative Development with Git	1
1.9	Introduction to Git Hub/ Git Lab/ Bi bucket	1
2.0	**Continuous Integration (CI)**	
2.1	CI/CD Pipeline Overview	1
2.2	Building and Testing Code Automatically	2
2.3	Introduction to Jenkins or other CI tools	1
2.4	Configuring Jenkins Jobs	2
2.5	Integration with Version Control	1
2.6	Automated Testing and Reporting	1
3.0	**Configuration Management**	
3.1	Infrastructure as Code (IaC) concepts	1
3.2	Introduction to Configuration Management Tools (e.g., Ansible)	1
3.3	Creating Playbooks/Roles for Automated Deployment	1
3.4	Managing Configuration Drift	1
3.5	Continuous Delivery and Deployment Understanding Continuous Delivery vs. Continuous Deployment	2
3.6	Blue-Green Deployments	1
3.7	Canary Deployments	2
3.8	Release Orchestration	1
4.0	**Containerization and Orchestration**	
4.1	Introduction to Containers (Docker)	2
4.2	Creating Docker Images	1
4.3	Container Registries (Docker Hub, AWS ECR)	2
4.4	Introduction to Kubernetes	1
4.5	Deploying Containers with Kubernetes	1
4.6	Monitoring and Logging Importance of Monitoring and Observability	1
4.7	Monitoring Tools (Prometheus, Grafana)	1
4.8	Application Logging and Log Management	1
5.0	**Security and Compliance**	
5.1	Security Principles in DevOps	1
5.2	Incorporating Security in CI/CD	1
5.3	Compliance and Auditing in Dev Ops	1
5.4	Cloud Services and Dev Ops Cloud Computing Overview	2
5.5	Infrastructure Automation in the Cloud	1
5.6	DevOps Best Practices and Case Studies Industry Best Practices	1
5.7	Case Studies of Successful DevOps Implementations	1

Course Designer(s)

Mr. K. Dineshkumar – dineshkumar@ksrct.ac.in

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60 IT E21	Business Analytics	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand the Analytics Life Cycle.
- To comprehend the process of acquiring Business Intelligence.
- To understand various types of analytics for Business Forecasting.
- To model the supply chain management for Analytics.
- To apply analytics for different functions of a business.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the real world business problems and model with analytical solutions.	Remember
CO2	Identify the business processes for extracting Business Intelligence	Understand
CO3	Apply predictive analytics for business fore-casting	Analyse
CO4	Apply analytics for supply chain and logistics management	Apply
CO5	Use analytics for marketing and sales.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3	1	1	-	-	-	1	2	1	1	3	2	-
CO2	3	3	3	2	3	-	-	-	1	2	2	2	3	1	-
CO3	2	2	3	3	2	-	-	-	3	1	1	3	3	1	-
CO4	2	1	1	2	2	-	-	-	3	3	2	1	1	3	-
CO5	2	3	2	3	2	-	-	-	3	3	1	3	3	1	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	20	-	-	30	-
Understand	40	-	20	-	-	40	-
Apply	-	50	10	50	50	20	50
Analyse	-	50	10	50	50	10	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

60 IT E21 – Business Analytics

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Introduction to Business Analytics Analytics and Data Science – Analytics Life Cycle – Types of Analytics – Business Problem Definition – Data Collection – Data Preparation – Hypothesis Generation – Modeling – Validation and Evaluation – Interpretation – Deployment and Iteration.	[6]
Business Intelligence Data Warehouses and Data Mart - Knowledge Management –Types of Decisions - Decision Making Process - Decision Support Systems – Business Intelligence –OLAP – Analytic functions.	[6]
Business Forecasting Introduction to Business Forecasting and Predictive Analytics - Logic and Data Driven Models – Data Mining and Predictive Analysis Modelling –Machine Learning for Predictive Analytics.	[6]
HR & Supply Chain Analytics Human Resources – Planning and Recruitment – Training and Development - Supply Chain Network -Planning Demand, Inventory and Supply – Logistics – Analytics applications in HR & Supply Chain - Applying HR Analytics to make a Prediction of the Demand for Hourly Employees for a Year.	[6]
Marketing & Sales Analytics Marketing Strategy, Marketing Mix, Customer Behaviour – Selling Process – Sales Planning – Analytics Applications in Marketing and Sales - Predictive Analytics for Customers' Behaviour in Marketing and Sales.	[6]
Practical: 1. Explore the features of Ms-Excel. 2. (i) Get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND). ii) Perform data import/export operations for different file formats. 3. Perform statistical operations - Mean, Median, Mode and Standard deviation, Variance, Skewness, Kurtosis. 4. Perform Z-test, T-test & ANOVA. 5. Explore the features of Power BI Desktop. 6. Prepare & Load data. 7. Develop the data model. 8. Perform DAX calculations. 9. Design a report. 10. Create a dashboard and perform data analysis. **Design Experiments:** 1. What are the different types of data visualization tools available in Excel (e.g., charts, sparklines)? 2. Use a sample dataset to calculate Mean, Median, Mode, Standard Deviation, Variance, Skewness, and Kurtosis using Excel functions and Compare these results with manual calculations or those obtained from statistical software **Tools used: MATLAB / ALTAIR / Open Source - Scilab**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Rao VSP, “Human Resource Management”, 3rd Edition, Excel Books, 2010.
2.	Mahadevan B, “Operations Management -Theory and Practice”,3rd Edition,

Reference(s):

1.	Bart Baesens , "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications"
2.	Foster Provost and Tom Fawcett, "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" .
3.	Neil Perkin and Peter Abraham,"Building the Agile Business through Digital Transformation: How to Lead Digital Transformation in Your Workplace" .
4.	Viktor Mayer-Schönberger and Kenneth Cukier ,"Big Data: A Revolution That Will Transform How We Live, Work, and Think"

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Introduction to Business Analytics**	
1.1	Analytics and Data Science - Analytics Life Cycle	1
1.2	Types of Analytics – Business Problem Definition	1
1.3	Data Collection – Data Preparation	1
1.4	Hypothesis Generation – Modeling	1
1.5	Validation and Evaluation	1
1.6	Interpretation – Deployment and Iteration	1
2.0	**Business Intelligence**	
2.1	Data Warehouses and Data Mart	1
2.2	Knowledge Management	1
2.3	Types of Decisions - Decision Making Process	1
2.4	Decision Support Systems	1
2.5	Business Intelligence	1
2.6	OLAP – Analytic functions.	1
3.0	**Business Forecasting**	
3.1	Introduction to Business Forecasting and Predictive analytics	2
3.2	Logic and Data Driven Models	1
3.3	Data Mining and Predictive Analysis Modelling	1
3.4	Machine Learning for Predictive analytics	2
4.0	**HR & Supply Chain Analytics**	
4.1	Human Resources – Planning and Recruitment	1
4.2	Training and Development - Supply chain network	1
4.3	Planning Demand, Inventory and Supply	1
4.4	Logistics	1
4.5	Analytics applications in HR & Supply Chain	1
4.6	Applying HR Analytics to Make a Prediction of the Demand for Hourly Employees for a Year.	1
5.0	**Marketing & Sales Analytics**	
5.1	Marketing Strategy, Marketing Mix, Customer Behaviour	1
5.2	Selling Process	1
5.3	Sales Planning	
5.4	Analytics Applications in Marketing and Sales	1
5.5	Predictive Analytics for Customers' Behaviour in Marketing and Sales.	2
Practical:		
20.	Explore the Features of Ms-Excel.	2
21.	(i) Get the Input from User and Perform Numerical Operations (MAX, MIN, AVG, SUM, SQRT, ROUND)	4
22.	Ii) Perform Data Import/Export Operations for Different File Formats.	4
23.	Perform Statistical Operations - Mean, Median, Mode and Standard Deviation, Variance, Skewness, Kurtosis	2
24.	Perform Z-Test, T-Test & ANOVA	2
25.	Explore the Features of Power BI Desktop	4
26.	Prepare & Load Data	4
27.	Develop the Data Model	2
28.	Perform DAX Calculations	4
29.	Design a Report	2

Course Designer(s)

1. Dr.K. Raja - rajak@ksrct.ac.in

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60 IT E22	Mobile Application Development	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To appreciate the Mobility landscape and familiarize with Mobile apps development aspects
- To design and develop mobile apps using Android as development platform with key focus on user experience design.
- To develop an app using native data handling techniques with background tasks and notifications
- To create an app using native hardware play, location awareness, graphics and multimedia
- To experience the process of performing testing, signing, packaging and distribution of mobile apps to take into market place.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the development environment to build mobile apps using emulator	Understand
CO2	Apply the user interface resources and activities to create mobile apps	Apply
CO3	Review the various building blocks of mobile apps to establish the connection with database	Apply
CO4	Create the graphics and animation techniques with multimedia for mobile app development using various sensors	Analyse
CO5	Recognize the process of testing an android app along with the method of versioning, signing, packaging and publishing.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	2	-	-	1	2	-	-	1	2	3	2
CO2	3	3	3	2	2	-	-	1	2	-	-	1	2	3	2
CO3	3	3	3	2	2	-	-	1	2	-	-	1	2	3	2
CO4	3	3	3	2	2	-	-	1	2	-	-	1	2	3	2
CO5	3	3	3	2	2	-	-	1	2	-	-	1	2	3	2
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	10	-	10	-	-	20	-
Understand	20	-	20	-	-	20	-
Apply	30	50	20	50	50	40	50
Analyse	-	50	10	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E22 - Mobile Application Development								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Getting Started with Mobility Mobility Landscape, Mobile Platforms, Mobile Apps Development, Overview of Android Platform, Setting up the Mobile App Development Environment along with an Emulator.	[6]
Building Blocks of Mobile Apps App User Interface Designing – Mobile UI Resources (Layout, UI Elements, Draw-able, Menu), Activity- States and Life Cycle, Interaction Amongst Activities, App Functionality Beyond User Interface - Threads, Async Task, Services.	[6]
Building Blocks of Mobile Apps States and Lifecycle, Notifications, Broadcast Receivers, Telephony and SMS APIs, Native Data Handling on Device File I/O, Shared Preferences, Mobile Database Such as SQLite and Enterprise Data Access (via Internet/Intranet).	[6]
Sprucing up Mobile Apps Graphics and Animation – Custom Views, Canvas, Animation APIs, Multimedia – Audio/Video Playback and Record, Location Awareness, and Native Hardware Access (Sensors such as Accelerometer and Gyroscope).	[6]
Testing and Taking Mobile Apps to Market Debugging Mobile Apps, White Box Testing, Black Box Testing, and Test Automation of Mobile Apps, JUnit for Android, Robotium, Monkey Talk - Versioning, Signing and Packaging Mobile Apps, Distributing Apps on Mobile Market Place.	[6]
Practical: 1. Setting Up the Development Environment and Run an App on the Android Emulator. 2. Develop an App that uses GUI Components and Layout. 3. Develop an App that makes use of Database. 4. Create an App to Play the Audio and Video Clips. 5. Design an App that Creates Alarm Clock and distribute it on Market Place. List of Equipment for a Batch Students 6. Standalone Desktops with Windows or Android or iOS or Equivalent Mobile Application. 7. Development Tools with Appropriate Emulators and Debuggers.	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Anubhav Pradhan, AnilV.Deshpande, “Composing Mobile Apps: Learn/Explore/Apply/ Using Android”, Wiley India Private Limited, 1st Edition,2014.
2.	Joseph AnnuzziJr., LaurenDarcey, Shane Conder, “Introduction to Android Application Development: AndroidEssentials, Developer's Library”, Addison-Wesley Professional, 4th Edition, 2013.
Reference(s):	
1.	Frank Ableson W, Sen R, Chrisking, “Android in Action”, Dreamtech Press, New Delhi, 3rdEdition, 2012.
2.	Erik Hellman, "Android Programming: Pushing the Limits", Kindle Edition, Wiley,2014.
3.	John Horton, "Android Programming for Beginners", Packt Publishing, 2nd Edition, 2015.
4.	Jerome DiMarzio, "Beginning Android Programming with Android Studio", John Wiley, 4thEdition, 2017.

*SDG 9 - Industry, Innovation and Infrastructure
**SDG 4-Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Getting Started with Mobility**	
1.1	Mobility Landscape	1
1.2	Mobile Platforms	1
1.3	Mobile Apps Development	1
1.4	Overview of Android Platform	2
1.5	Setting up the Mobile App Development Environment Along with an Emulator	1
2.0	**Building Blocks of Mobile Apps**	
2.1	App User Interface Designing	1
2.2	Mobile UI Resources	1
2.3	Draw-able, Menu	1
2.4	Activity- States and Life Cycle	1
2.5	Interaction Amongst Activities, Async Task	1
2.6	App Functionality Beyond User Interface – Threads, Services	1
3.0	**Building Blocks of Mobile Apps**	
3.1	States and Lifecycle	1
3.2	Notifications, Broadcast Receivers	1
3.3	Telephony and SMS APIs	1
3.4	Native Data Handling on Device File I/O	1
3.5	Shared Preferences	1
3.6	Mobile Database such as SQLite and Enterprise Data Access	1
4.0	**Sprucing up Mobile Apps**	
4.1	Graphics and Animation, Custom Views	1
4.2	Canvas, Animation APIs	1
4.3	Multimedia – Audio/Video Playback and Record	1
4.4	Location Awareness	2
4.5	Native Hardware Access	1
5.0	**Testing and Taking Mobile Apps to Market**	
5.1	Debugging Mobile Apps	1
5.2	White Box Testing, Black Box Testing	1
5.3	Test Automation of Mobile Apps	1
5.4	JUnit for Android	1
5.5	Robotium, MonkeyTalk - Versioning	1
5.6	Signing and Packaging Mobile Apps, Distributing	1
Practical:		
1.	Setting Up the Development Environment and Run an App on the Android Emulator	4
2.	Develop an App that uses GUI Components and Layout	4
3.	Develop an App that makes use of Database	4
4.	Create an App to Play the Audio and Video Clips	4
5.	Design an App that Creates Alarm Clock and distribute it on Market Place. List of Equipment for a Batch Students	4
6.	Standalone Desktops with Windows or Android or iOS or Equivalent Mobile Application	5
7.	Development Tools with Appropriate Emulators and Debuggers.	5
	Total Hours: (Lecture - 30; Practical - 30)	**60**

Course Designer(s)

1. . Mr.P.Dineshkumar – p.dineshkumar@ksrct.ac.in

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60 IT E23	Multimedia and Animation	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To grasp the fundamental knowledge of Multimedia elements and systems
- To get familiar with Multimedia file formats and standards
- To learn the process of Authoring multimedia presentations
- To learn the techniques of animation in 2D and 3D and for the mobile UI
- To explore different popular applications of multimedia

Pre-requisites

- Computer Graphics

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Get the bigger picture of the context of Multimedia and its applications	Remember
CO2	Use the different types of media elements of different formats on content pages	Understand
CO3	Design various multimedia tools and software applications	Analyse
CO4	To create animations using different techniques, including 2D animation and 3D animation	Apply
CO5	To develop the effective presentation and skills provided in the industry	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	2	3	-	-	-	3	2	1	2	3	2	3
CO2	3	3	3	3	3	-	-	-	3	3	2	2	3	2	3
CO3	3	3	3	3	3	-	-	-	3	3	2	3	3	2	3
CO4	3	3	3	3	3	2	-	-	3	3	3	3	3	3	3
CO5	3	3	3	3	3	2	-	-	3	3	3	3	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	30	-	10	-	-	20	-
Understand	30	-	20	-	-	30	-
Apply	-	50	20	50	50	30	50
Analyse	-	50	10	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.TECH – Information Technology								
60 IT E23 – Multimedia and Animation								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Introduction to Multimedia Definitions – Elements - Multimedia Hardware and Software - Distributed Multimedia Systems - Challenges faced in Multimedia: Security- Sharing – Storage-Retrieval –Processing	[6]
Multimedia File Formats and Standards * File formats – Text, Image File Formats- Graphic and Animation File Formats- Digital Audio and Video File Formats- Color in Image and Video- Color Models.	[6]
Multimedia Authoring ** Authoring Metaphors- Tools Features and Types: Card and Page Based Tools, Icon and Object Based Tools, Time Based Tools, Cross Platform Authoring Tools, Editing Tools, Painting and Drawing Tools, 3D Modeling and Animation Tools	[6]
Animation Principles of Animation: Staging - Squash and Stretch - Timing-Onion Skinning - Secondary Action-2 ½ D and 3D Animation, Animation Techniques: Key Frame – Morphing - Inverse Kinematics - Hand Drawn	[6]
Multimedia Applications Multimedia Big Data Computing-Social Networks - Smart Phones – Surveillance – Analytics - Multimedia Cloud Computing	[6]
Practical: 1. Use Different Selection and Transform Tools to Modify or Improve an Image. 2. Create Logos and Banners for Home Pages of Websites. 3. Design Simple Home Page with Banners, Logos and Tables Quick Links. 4. Provide a Search Interface and Simple Navigation from the Home Page to the Inside Pages of the Website. 5. Design Responsive Web Pages for Use on Both Web and Mobile Interfaces. 6. Perform a Simple 2D Animation with Sprites. 7. Demonstrate Screen Recording and Further Editing for E-Learning Content. 8. Create a Simple E-Learning Module for a Topic of your Choice. 9. Perform Audio Compression by Choosing a Proper Codec. 10. Perform Simple 3D Animation with Keyframes, Kinematic. **Design Experiments** 1. Create VR and AR applications, you can use Affordable VR viewers like Google Cardboard and Development Platforms such as Openspace3D and ARCore. 2. Design a Certificate using Multimedia Tools **Tools used: InkScape/ WordPress / Audacity/ Blender**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):	
1.	Emilio Rodriguez Martinez, Mireia Alegre Ruiz, “UI Animations with Lottie and After Effects: Create, Render, and Ship Stunning After Effects animations natively on mobile with React Native”, Packet Publishing, 2022.
2.	Ze-Nian Li, Mark S. Drew, Jiangchuan Liu, “Fundamentals of Multimedia (UNIT-I, II, III)”, Third Edition, Springer Texts in Computer Science, 2021.
Reference(s):	
1.	Mohsen Amini Salehi, Xiangbo Li, “Multimedia Cloud Computing Systems”, Springer Nature, 1st Edition, 2021.
2.	Gerald Friedland, Ramesh Jain, “Multimedia Computing”, Cambridge University Press, 2nd Edition,2020.
3.	Rick parent, “Computer Animation: Algorithms and Techniques”, Morgan Kauffman, 4th Edition,2019
4.	Prabhat K.Andleigh, Kiran Thakrar, “Multimedia System Design”, Pearson Education, 3rd Edition,2020

*SDG 4 – Quality in Education

**SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of Hours**
1	**Introduction to Multimedia**	
1.1	Definitions - Elements	1
1.2	Multimedia Hardware and Software	1
1.3	Distributed Multimedia Systems	1
1.4	Challenges Faced in Multimedia: Security, Sharing	1
1.5	Storage-Retrieval	1
1.6	Processing	1
2.0	**Multimedia File Formats and Standards**	
2.1	File Formats	1
2.2	Text File Formats	1
2.3	Image File Formats, Graphic and Animation Formats	1
2.4	Digital Audio and Video Formats	1
2.5	Color in Image and Video	1
2.6	Color Models	1
3.0	**Multimedia Authoring**	
3.1	Authoring Metaphors, Card and Page Based Tools	1
3.2	Icon and Object Based Tools	1
3.3	Time Based Tools	1
3.4	Cross Platform Authoring Tools	1
3.5	Editing Tools, Painting and Drawing Tools	1
3.6	3D Modeling and Animation Tools	1
4.0	**Animation**	
4.1	Principles of Animation: Staging, Squash and Stretch	1
4.2	Onion Skinning, Secondary Action	1
4.3	2D, 2 ½ D, and 3D animation	1
4.4	Animation Techniques: Key frame, Morphing	1
4.5	Inverse Kinematics	1
4.6	Hand Drawn	1
5.0	**Multimedia Applications**	
5.1	Multimedia BigData Computing	1
5.2	Social Networks	1
5.3	Smart Phones	1
5.4	Surveillance	1
5.5	Analytics	1
5.6	Multimedia Cloud Computing	1
Practical:		
1.	Use Different Selection and Transform Tools to Modify or Improve an Image.	2
2.	Create Logos and Banners for Home Pages of Websites.	2
3.	Design Simple Home Page with Banners, Logos and Tables Quick Links.	2
4.	Provide a Search Interface and Simple Navigation from the Home Page to the Inside Pages of the Website.	2
5.	Design Responsive Web Pages for Use on Both Web and Mobile Interfaces.	3
6.	Perform a Simple 2D Animation with Sprites.	4
7.	Demonstrate Screen Recording and Further Editing for E-Learning Content.	4
8.	Create a Simple E-Learning Module for a Topic of your Choice.	4
9.	Perform Audio Compression by Choosing a Proper Codec.	4
10.	Perform Simple 3D Animation with Keyframes, Kinematic.	3
	Total Hours: (Lecture - 30; Practical - 30)	**60**

Course Designer(s)

1. Mr.M.Thilakraj - mthilakraj@ksrct.ac.in

Rev. No.1/w.e.f. 19/07/2025
Approved Passed in BoS Meeting held on 18/06/2025
in Academic Council Meeting held on 19/07/2025

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60 IT E24	Soft Computing and Optimization	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To introduce the ideas of fuzzy sets and fuzzy logic.
- To provide the mathematical background for carrying out the optimization associated with neural network learning.
- To learn various evolutionary Algorithms.
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.
- To introduce case studies utilizing the above and illustrate the intelligent behaviour of programs based on soft computing.

Pre-requisites

- Basic knowledge of Mathematics and programming concepts

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the fundamentals of fuzzy logic operators and inference mechanisms.	Understand
CO2	Explain neural network architecture for AI applications such as classification and clustering.	Understand
CO3	Discuss the functionality of Genetic Algorithms in Optimization problems.	Understand
CO4	Implement hybrid techniques involving Neural networks and Fuzzy logic.	Analyse
CO5	Apply soft computing techniques in real world applications.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1	2	2	3	-	-	-	1	1	2	2	-	2	2
CO2	1	1	2	2	3	-	-	-	1	1	2	2	-	2	2
CO3	1	1	2	2	3	-	-	-	1	1	2	2	-	2	2
CO4	1	1	2	2	3	-	-	-	1	1	2	2	-	2	2
CO5	1	1	2	2	3	-	-	-	1	1	2	2	-	2	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	10	-	-	20	-
Understand	40	-	20	-	-	30	-
Apply	-	50	10	50	50	20	50
Analyse	-	50	20	50	50	30	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

60 IT E24 – Soft Computing and Optimization

Semester	Hours / Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Fuzzy Logic Introduction - Fuzzy Logic: Fuzzy Sets, Fuzzy Membership Functions - Operations on Fuzzy Sets: Fuzzy Relations, Fuzzy Rules and Fuzzy Reasoning - Fuzzy Inference Systems.	[6]
Neural Networks Supervised Learning Neural Networks – Perceptrons – Back Propagation - Multilayer Perceptrons – Unsupervised Learning Neural Networks.	[6]
Genetic Algorithms Chromosome Encoding Schemes -Population initialization and selection methods - Evaluation function - Genetic operators- Cross over – Mutation - Fitness Function.	[6]
Neuro Fuzzy Modeling ANFIS Architecture: Hybrid Learning, ANFIS as universal approximator – Coactive Neuro Fuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.	[6]
Applications * Printed Character Recognition - Fuzzy Filtered Neural Networks - Hand Written Neural Recognition - Soft Computing for Color Recipe Prediction.	[6]
Practical: 1. Implementation of Fuzzy Systems using Fuzzy Logic Designer 2. Design Fuzzy Logic Rules to Adapt the Traffic Light Timings Dynamically Based on Traffic Conditions 3. Classify Images from the Given Dataset using Pretrained Neural Network 4. Create a Simple Feed Forward Neural Network Architecture 5. Implement a Neural Network to Solve the Exclusive or Problem using the Backpropagation Algorithm 6. Train a Neural Net that Uses any Dataset and Plot the Cluster of Patterns 7. Programming Exercises on Maximizing a Function using Genetic Algorithm 8. Implement Ga for the Travelling Salesman Problem to Find the Shortest Path that Visits All Cities in a Set Exactly once 9. Design and Implement an Application in Health Care Domain using Soft Computing Techniques 10. Design and Implement a Neural Network for Character Recognition. **Tools used: MATLAB / Open Source – Scilab, Google Colab**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Sivanandam S.N., and Deepa S.N., “Principles of Soft Computing”, Third Edition, Wiley-India, 2019.
2.	Padhy N.P., and Sishaj P. Simon, “Soft computing: with MATLAB programming”, Oxford University Press, Inc., 2015.

Reference(s):

1.	Roj Kaushik and Sunita Tiwari, “Soft Computing-Fundamentals Techniques and Applications”, 1st Edition, McGraw Hill, 2018.
2.	Rajasekaran S., and Vijayalakshmi Pai G.A., “Neural Networks, FuzzyLogic and Genetic Algorithm, Synthesis and Applications”, PHI Learning, 2017.
3.	Samir Roy, and Udit Chakraborthy,” Introduction to Soft Computing, Neuro Fuzzy and Genetic Algorithms”, Pearson Education, 2013.
4.	David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Pearson Education, 2013.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Fuzzy Logic**	
1.1	Introduction	1
1.2	Fuzzy Logic: Fuzzy Sets	1
1.3	Fuzzy Membership Functions	1
1.4	Operations on Fuzzy Sets: Fuzzy Relations	1
1.5	Fuzzy Rules and Fuzzy Reasoning	1
1.6	Fuzzy Inference Systems	1
2.0	**Neural Networks**	
2.1	Supervised Learning Neural Networks	2
2.2	Perceptrons	1
2.3	Back Propagation	1
2.4	Multilayer Perceptrons	1
2.5	Unsupervised Learning Neural Networks	1
3.0	**Genetic Algorithms**	
3.1	Chromosome Encoding Schemes	1
3.2	Population Initialization and Selection Methods	1
3.3	Evaluation Function	1
3.4	Genetic Operators	1
3.5	Cross Over, Mutation	1
3.6	Fitness Function	1
4.0	**Neuro Fuzzy Modeling**	
4.1	ANFIS Architecture: Hybrid Learning	1
4.2	ANFIS as universal approximator	1
4.3	Coactive Neuro Fuzzy Modeling	1
4.4	Framework	1
4.5	Neuron Functions for Adaptive Networks	1
4.6	Neuro Fuzzy Spectrum	1
5.0	**Applications**	
5.1	Printed Character Recognition	2
5.2	Fuzzy Filtered Neural Networks	1
5.3	Hand Written Neural Recognition	1
5.4	Soft Computing for Color Recipe Prediction	2
Practical:		
1.	Implementation of Fuzzy Systems using Fuzzy Logic Designer	2
2.	Design Fuzzy Logic Rules to Adapt the Traffic Light Timings Dynamically Based on Traffic Conditions	2
3.	Classify Images from the Given Dataset using Pretrained Neural Network	4
4.	Create a Simple Feed Forward Neural Network Architecture	4
5.	Implement a Neural Network to Solve the Exclusive or Problem using the Backpropagation Algorithm	2
6.	Train a Neural Net that Uses any Dataset and Plot the Cluster of Patterns	2
7.	Programming Exercises on Maximizing a Function using Genetic Algorithm	2
8.	Implement Ga for the Travelling Salesman Problem to Find the Shortest Path that Visits All Cities in a Set Exactly once	4
9.	Design and Implement an Application in Health Care Domain using Soft Computing Techniques	4
10.	Design and Implement a Neural Network for Character Recognition	4
	Total Hours: (Lecture - 30; Practical - 30)	**60**

Course Designer(s)

1. Dr.J.Nithya - nithyaj@ksrct.ac.in

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60 IT E25	Cyber Security and Forensics	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand the basic structure of information systems
- To explore various security policies and employee responsibilities.
- To understand the significance of information security.
- To learn the various tools and methods used in Cybercrime.
- To endow with an overview of hand-held Devices and characteristics

Pre-requisites

- Basic knowledge of Cyber Crime

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Classify and develop the Information systems	Remember
CO2	Explore the concept of mobile and wireless devices	Understand
CO3	Identify the methods and tools used in cybercrime	Apply
CO4	Analyse the methods and techniques used in computer forensics	Analyse
CO5	Identify the organizational implications with respect to cost and issues in cybercrime	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	20	-	-	20	-
Understand	40	-	20	-	-	40	-
Apply	-	50	10	50	50	20	50
Analyse	-	50	10	50	50	20	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E25 – Cyber Security and Forensics								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Introduction Information System Components – Information System Categories – Individuals in the Information Systems – Development of Information Systems	[6]
Cybercrime* Mobile and Wireless Devices -Trend Mobility - Authentication Service Security - Attacks on Mobile Phones - Mobile Phone Security Implications for Organizations Organizational Measurement for Handling Mobile	[6]
Tools and Methods used in Cybercrime Proxy Servers and Anonymizers – Phishing - Password Cracking - Key Loggers and Spywares – Virus and Worms - Trojan Horse and Backdoors - Steganography – DOS and DDOS Attacks - SQL Injection - Buffer Overflow - Attacks on Wireless Network.	[6]
The Legal Perspectives and Computer Forensics** Indian IT Act - Understanding Computer Forensic - Historical Background of Cyber Forensic – Forensic Analysis of E-mail - Digital Forensic Life Cycle - Network Forensic	[6]
Forensic of Hand Held Devices and Organizational Implications Understanding Cell Phone Working Characteristics - Hand - Held Devices and Digital Forensic – Toolkits for Hand - Held Device - Forensic of I- Pod and Digital Music Devices.	[6]
Practical: 1. Install Kali Linux on Virtual Box 2. Explore Kali Linux and Bash Scripting 3. Perform Open Source Intelligence Gathering Using Netcraft, Who is Lookups, DNS Reconnaissance, Harvester and Maltego 4. Understand the Nmap Command d and Scan a Target Using Nmap 5. Install Metasploitable2 on the Virtual Box and Search for Unpatched Vulnerabilities **6.** Use Metasploit to Exploit an Unpatched Vulnerability	[30]
Total Hours:(Theory – 30 + Practical – 30)	**60**

Text Book(s):	
1.	Nina Godbole, SunitBelapure “Cyber security understanding cyber crimes, computer forensics and legal perspectives”, Wiley publication, 2020.
2.	Bhushan, Rathore, and Jamshed “Fundamentals of Cyber Security”BPB Publication,2022.
Reference(s):	
1.	Adv. Prashant Mali “Cyber Law & Cyber Crimes Simplified”, 6th Edition, Kindle Edition, 2021.
2.	Pankaj Agarwal, “Information Security & Cyber Laws (Acme Learning)”, Excel, 2020.
3.	Nina Godbole, SunitBelapure “Cyber security Understanding Cyber Crimes, Computer Forensics and Legalperspectives”, Wiley publication, 2020.
4.	Dr. Jeetendra Pande “Introduction to Cyber Security “, 3rd Edition,2020.

* SDG-4 – Quality Education

** SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Information System Components	1
1.2	Information System Categories	1
1.3	Information System Categories	1
1.4	Individuals in the Information Systems	1
1.5	Individuals in the Information Systems	1
1.6	Development of Information Systems	1
2.0	**Cybercrime**	
2.1	Mobile and Wireless Devices, Trend Mobility,	1
2.2	Authentication Service Security	1
2.3	Attacks on Mobile Phones	1
2.4	Mobile Phone Security Implications for Organizations	1
2.5	Mobile Phone Security Implications for Organizations	1
2.6	Organizational Measurement for Handling Mobile	1
3.0	**Tools and Methods used in Cybercrime**	
3.1	Proxy Servers and Anonymizers, Phishing, Password Cracking	1
3.2	Key Loggers and Spy Wares, Virus and Worms	1
3.3	Trojan Horse and Backdoors, Steganography	1
3.4	DOS and DDOS Attacks	1
3.5	SQL Injection	1
3.6	Buffer Overflow, Attacks on Wireless Network.	1
4.0	**The Legal Perspectives and Computer Forensics**	
4.1	Indian IT Act	1
4.2	Understanding Computer Forensic	1
4.3	Historical Background of Cyber Forensic	1
4.4	Forensic Analysis of E-mail	1
4.5	Digital Forensic Life Cycle	1
4.6	Network Forensic	1
5.0	**Forensic of Hand-Held Devices and Organizational Implications**	
5.1	Understanding Cell Phone Working Characteristics	1
5.2	Hand, Held Devices and Digital Forensic	1
5.3	Toolkits for Hand	1
5.4	Held Device	1
5.5	Forensic of I- Pod and Digital Music Devices	1
5.6	Forensic of I- Pod and Digital Music Devices	1
Practical:		
1.	Install Kali Linux on Virtual Box	5
2.	Explore Kali Linux and Bash Scripting	5
3.	Perform Open Source Intelligence Gathering Using Netcraft, Who is Lookups, DNS Reconnaissance, Harvester and Maltego	5
4.	Understand the Nmap Command d and Scan a Target Using Nmap	5
5.	Install Metasploitable2 on the Virtual Box and Search for Unpatched Vulnerabilities	5
6.	Use Metasploit to Exploit an Unpatched Vulnerability	5
	Total Hours: (Lecture - 30; Practical - 30)	**60**

Course Designer(s)

1. Mr.S.Arulmurugan - arulmurugans@ksrct.ac.in

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60 IT E26	Big Data Analytics	Category	L	T	P	Credit
		PE	2	0	2	3

Objectives

- To understand the basics of big data analytics
- To understand the search methods and visualization
- To learn mining data streams
- To learn frameworks
- To gain knowledge on R language

Pre-requisites

- Basic knowledge of mathematics and Python and R programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basics of big data analytics.	Remember
CO2	Ability to use Hadoop, Map Reduce Framework.	Understand
CO3	Ability to identify the areas for applying big data analytics for increasing the business outcome.	Understand
CO4	Contextually integrate and correlate large amounts of information to gain faster insights.	Analyse
CO5	Gain basic knowledge on R language.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	3	2	3	2	-	-	2	-	-	-	2	2	2
CO2	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
CO3	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
CO4	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
CO5	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	20	-	20	-	-	30	-
Understand	40	-	20	-	-	40	-
Apply	-	50	10	50	50	20	50
Analyse	-	50	10	50	50	10	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-	-	-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E26 - Big Data Analytics								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	2	0	2	60	3	50	50	100

Introduction to Big Data* Introduction to Big Data Platform –- Intelligent data analysis–- Analytic Processes and Tools - Analysis Vs Reporting - Modern Data Analytic Tools- Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference	[6]
Search Methods and Visualization Search by Simulated Annealing – Stochastic, Adaptive Search by Evaluation - Genetic Algorithm – Visualization – Classification of Visual Data Analysis Techniques - Visualization Techniques - Interaction Techniques	[6]
Mining Data Streams Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform (RTAP) Applications	[6]
Frameworks* MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Case Study- Preventing Private Information Inference Attacks on Social Networks.	[6]
R Language Overview, Programming structures: Control Statements -Functions-Environment and Scope Issues - Recursion - Replacement functions, R Data Structures: Vectors - Matrices and arrays - Lists - Data frames - Classes, Input/output, String manipulations	[6]
Practical: 1. Visualize Data using Basic Plotting Techniques in Python. 2. Installation of Single Node Hadoop Cluster on Ubuntu 3. Hadoop Programming: Word Count MapReduce Program using Eclipse 4. Implement Word Count / Frequency Programs using MapReduce (MR). 5. Develop a MapReduce Program to find the Maximum Temperature in Each Year 6. Write Queries to Sort and Aggregate the Data in a Table Using HiveQL 7. Develop a Java Application to find the Maximum Temperature Using Spark 8. Develop a MapReduce to find the Maximum Electrical Consumption in Each Year Given Electrical Consumption for Each Month in Each Year. 9. Implement an Application that Stores Big Data in Hbase / MongoDB using Hadoop / R 10. Implement SVM and Clustering Techniques Using R. **Tools used: Jupiter Notebook /Eclipse/ R Programming / MangoDB / SQL**	[30]
Total Hours: (Lecture - 30; Practical - 30)	**60**

Text Book(s):

1.	Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2.	Anand Rajaraman and Jeffrey David Ullman,” Mining of Massive Datasets”, Cambridge University Press, 3rd edition 2020.

Reference(s):

1.	Norman Matloff, “The Art of R Programming: A Tour of Statistical Software Design”, No Starch Press, USA, 2011.
2.	Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
3.	Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of Hours
1.0	**Introduction To Big Data**	
1.1	Introduction to Big Data Platform –- Intelligent Data Analysis	1
1.2	Analytic Processes and Tools - Analysis Vs Reporting	1
1.3	Modern Data Analytic Tools	1
1.4	Statistical Concepts : Sampling Distributions	1
1.5	Re-Sampling	1
1.6	Statistical Inference	1
2.0	**Search Methods and Visualization**	
2.1	Search by simulated Annealing – Stochastic, Adaptive Search by Evaluation	1
2.2	Genetic Algorithm	1
2.3	Visualization	1
2.4	Classification of Visual Data Analysis Techniques	1
2.5	Visualization Techniques	1
2.6	Interaction Techniques	1
3.0	**Mining Data Streams**	
3.1	Stream Data Model and Architecture - Stream Computing -	1
3.2	Sampling Data in a Stream – Filtering Streams	1
3.3	Counting Distinct Elements in a Stream – Estimating Moments	1
3.4	Counting Oneness in a Window	1
3.5	Decaying Window	1
3.6	Real time Analytics Platform (RTAP) Applications	1
4.0	**Frameworks**	
4.1	MapReduce	1
4.2	Hadoop, Hive, MapR	1
4.3	Sharding	1
4.4	NoSQL Databases	1
4.5	S3 - Hadoop Distributed File Systems	1
4.6	Case Study- Preventing Private Information Inference Attacks on Social Networks	1
5.0	**R Language**	
5.1	Overview, Programming Structures: Control Statements - Functions	1
5.2	Environment and Scope Issues - Recursion - Replacement functions	1
5.3	R data structures : Vectors	1
5.4	Matrices and Arrays	1
5.5	Lists -Data Frames	1
5.6	Classes, Input/output, String manipulations	1
Practical		
30.	Visualize Data using Basic Plotting Techniques in Python.	2
31.	Installation of Single Node Hadoop Cluster on Ubuntu	2
32.	Hadoop Programming: Word Count MapReduce Program using Eclipse	3
33.	Implement Word Count / Frequency Programs using MapReduce (MR).	3
34.	Develop a MapReduce Program to find the Maximum Temperature in Each Year	3
35.	Write Queries to Sort and Aggregate the Data in a Table using HiveQL	4
36.	Develop a Java Application to find the Maximum Temperature Using Spark	4
37.	Develop a MapReduce to find the Maximum Electrical Consumption in Each Year Given Electrical Consumption for Each Month in Each Year.	4
38.	Implement an Application that Stores Big Data in Hbase / MongoDB using Hadoop / R	3
39.	Implement SVM and Clustering Techniques Using R.	2

Course Designer(s)

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60 CS E27	Advanced Java	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To enable the students to learn Java Collections Framework.
- To understand the Collections Utility and Concurrent Collections in Java.
- To create and use Spring Framework and Enterprise JavaBeans (EJB).
- To understand Java 8 Features.
- To understand Web Services and Design Patterns.

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the principles of Java Collections Framework	Understand
CO2	Implement Collections Utility and Concurrent Collections in Java	Apply
CO3	Create and use Spring Framework and Enterprise JavaBeans (EJB)	Apply
CO4	Analyzing the Java 8 Features	Analyse
CO5	Implement the concept of Web Services and Design Patterns	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	-	3	-	-	-	3	3	2	3	2	-	-
CO2	3	3	3	-	3	2	-	2	3	3	2	3	3	2	-
CO3	2	3	3	-	3	-	-	2	3	3	2	3	3	2	-
CO4	3	3	3	2	3	2	-	-	3	3	2	3	3	2	-
CO5	2	3	3	2	3	2	-	-	3	3	2	3	3	-	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	20	30
Apply	30	20	40
Analyse	-	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 CS E27 - Advanced Java								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Java Collections Framework Introduction to Collections, Overview of the Java Collections Framework (JCF), Importance of collections in Java programming, Core Interfaces- List, Set, and Map interfaces, hierarchy of collection interfaces, Lists and their Implementations - ArrayList and LinkedList, Sets and their Implementations - HashSet, LinkedHashSet, and TreeSet, Maps and their Implementations- HashMap, LinkedHashMap, and TreeMap, Key-value pairs, ordering, and special features.	[9]
Collections Utility and Concurrent Collections Common Utility Methods - Sorting, Searching, and Synchronization, Custom Objects in Collections- Implementing Comparable and Comparator Interfaces, Customizing Sorting for User-Defined Classes, Concurrent Collections - ConcurrentHashMap and CopyOnWriteArrayList, Collections Best Practices - Guidelines for Choosing the Right Collection, Performance Considerations and Best Coding Practices.	[9]
Spring Framework and Enterprise JavaBeans (EJB) Overview of the Spring framework - Dependency Injection and Inversion of Control (IoC), Spring MVC - Building Web Applications, Controllers, Views, and Forms, Spring Data and Hibernate Integration, Integrating Spring with Hibernate, Spring Data. Introduction to EJB - Session Beans, Entity Beans, and Message - Driven Beans, EJB 3.X Features - Annotations and Simplifications.	[9]
Java 8 Features Lambda Expressions, Method References, Functional Interfaces, Stream API, Default Methods, Base64 Encode Decode, Static Methods in Interface, Optional Class, Collectors Class, ForEach() Method, Nashorn JavaScript Engine, Parallel Array Sorting, Type and Repeating Annotations, IO Enhancements, Concurrency Enhancements, JDBC Enhancements.	[9]
Web Services and Design Patterns Web Services - SOAP and RESTful Web Services, JAX-RS and JAX-WS for Java Web Services. Design Patterns in Java - Overview of Design Patterns – Categories, Creational Design Patterns - Singleton, Factory, Builder, Prototype. Structural Design Patterns – Adapter, Bridge, Composite, Decorator. Behavioral Design Patterns – Observer, Strategy, Command. Additional Design Patterns and Best Practices - Chain of Responsibility Pattern, Visitor and Template Method patterns.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Uttam Kumar Roy, “Advanced Java Programming”, UK Edition, OUP India, 2015.
2.	Nageswara Rao R, DT Editorial Services, “Core Java: An Integrated Approach”, Dreamtech Press, 1st Edition, 2016.
Reference(s) :	
1.	Anuradha A. Puntambekar, “Advanced Java”, Technical Publications, 2020.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Java Collections Framework**	
1.1	Introduction to Collections, Overview of the Java Collections Framework (JCF), Importance of collections in Java programming, Core Interfaces	2
1.2	List, Set, and Map interfaces, hierarchy of collection interfaces, Lists and their Implementations	2
1.3	ArrayList and LinkedList, Sets and their Implementations	1
1.4	HashSet, LinkedHashSet, and TreeSet, Maps and their Implementations	2
1.5	HashMap, LinkedHashMap, and TreeMap, Key	1
1.6	value pairs, ordering, and special features	1
2.0	**Collections Utility and Concurrent Collections**	
2.1	Common utility methods	2
2.2	Sorting, searching, and synchronization, Custom Objects in Collections	2
2.3	Implementing Comparable and Comparator interfaces, customizing sorting for user-defined classes, Concurrent Collections	2
2.4	Concurrent HashMap and Copy On Write Array List, Collections Best Practices	2
2.5	Guidelines for choosing the right collection, Performance considerations and best coding practices.	1
3.0	**Spring Framework and Enterprise JavaBeans (EJB)**	
3.1	Overview of the Spring framework	1
3.2	Dependency injection and Inversion of Control (IoC), Spring MVC	2
3.3	Building web applications, Controllers, views, and forms, Spring Data and Hibernate Integration, Integrating Spring with Hibernate, Spring Data. Introduction to EJB	2
3.4	Session beans, entity beans, and message-driven beans, EJB 3.x Features	2
3.5	Annotations and simplifications	2
4.0	**Java 8 Features**	
4.1	Lambda expressions, Method references, Functional interfaces	2
4.2	Stream API, Default methods, Base64 Encode Decode	2
4.3	Static methods in interface, Optional class, Collectors class	1
4.4	ForEach() method, Nashorn JavaScript Engine, Parallel Array Sorting	1
4.5	Type and Repeating Annotations, IO Enhancements	2
4.6	Concurrency Enhancements, JDBC Enhancements	1
5.0	**Web Services and Design Patterns**	
5.1	Web Services	1
5.2	SOAP and RESTful web services, JAX-RS and JAX-WS for Java web services. Design Patterns in Java	1
5.3	Overview of Design Patterns – Categories, Creational Design Patterns	2
5.4	Singleton, Factory, Builder, Prototype. Structural Design Patterns	1
5.5	Adapter, Bridge, Composite, Decorator. Behavioral Design Patterns	1
5.6	Observer, Strategy, Command. Additional Design Patterns and Best Practices	1
5.7	Chain of Responsibility Pattern, Visitor and Template Method patterns	2

Course Designer(s)

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60 CS E37	Data Analytics	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To know the basic data analytics concepts
- To understand the Data Collection and Preprocessing
- To understand Exploratory Data Analytics (EDA)
- To learn Statistical Data Analytics
- To know about Distributed File Systems

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of data analytics	Understand
CO2	Understand the data collection and preprocessing	Understand
CO3	Apply Exploratory Data Analytics (EDA)	Apply
CO4	Apply the knowledge of statistical data analytics	Apply
CO5	Understand the distributed file systems	Understand

Mapping with Programme Outcomes

Cos	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	-	-	-	-	-	-	-	2	-	3	-
CO2	2	3	3	-	3	-	-	-	-	-	-	3	-	3	-
CO3	3	3	2	-	3	-	-	-	2	2	2	3	-	3	-
CO4	3	3	2	-	3	-	-	2	2	2	2	3	-	3	-
CO5	3	3	3	-	3	-	-	2	2	2	2	3	-	3	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	10
Understand	40	30	50
Apply	-	20	40
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

60 CS E37 - Data Analytics

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Introduction Overview of Data Analytics - Business Intelligence- Pattern Recognition- Data Processing Chain- Bi For Better Decisions- Decision Types- Bi Tools - Bi Applications - Introduction to Big Data - Data Analysis Life Cycle - Overview of Popular Programming Tools (Python, R, Sql) for Data Analysis - Introduction to Data Visualization Tools (Tableau, Power Bi) and their Significance - Understand the Statistical Concepts: Descriptive and Inferential Statistics - Summary Statistics: Mean, Median, Mode, Range, Standard Deviation, Quartiles and Correlation.	[9]
Data Collection And Preprocessing Introduction to Data Sources - Data Cleaning - Data Transformation - Normalization/Scaling- Log Transformation - Handling Categorical Data- One-Hot Encoding- Label Encoding- Dealing with Imbalanced Data - Handling Date and Time Data- Feature Engineering- Removing Redundant Features - Data Integration- Handling , Duplicate Data- Data Splitting - Data Standardization.	[9]
Exploratory Data Analytics (Eda) Introduction, Data Visualization Techniques -Univariate, Bivariate, and Multivariate Plots - Selection of Appropriate Charts (Histograms, Box Plots, Scatter Plots) - Data Distribution Analysis: Normality Testing, Skewness and Kurtosis, Correlation and Covariance - Handling Outliers in Eda - Data Patterns and Trends: Time Series Analysis, Seasonality and Trends - Exploring Relationships: Heatmaps for Correlation, Pair Plots - Hypothesis Testing: Formulating Hypotheses and Selecting The Right Test (T-Tests, Anova) - Interactive Eda Tools: Use Tools Like Tableau Power Bi and Create Interactive Dashboards.	[9]
Statistical Data Analytics Linear Regression - Logistic Regression - Multinomial Logistic Regression - Poisson Regression - Generalized Linear Models (Glm) - Time Series Models.	[9]
Distributed File Systems Hadoop Distributed File System (Hdfs) and Google File System (Gfs) - Nosql Databases: Explore Distributed Databases like Apache Cassandra, Mongodb, or Amazon Dynamodb. Distributed Processing - Mapreduce Programming Model for Distributed Processing. Apache Spark Framework for in-Memory Data Processing.	[9]
Total Hours:	**45**

Text Book(s):

1	Anil Maheshwari, “Data Analytics – Made Accessible”, Kindle Edition, 1st edition, 2014.
2	Michael Berthhold, David J.Hand, “Intelligent Data Analysis”, Springer, 2nd Edition, 2015.

Reference(s) :

1.	Shai Vaingast, “Beginning Python Visualization Crafting Visual Transformation Scripts”, Apress, 2nd edition, 2014.
2.	Wes Mc Kinney, “Python for Data Analysis”, O'Reilly Media, 2012
3.	White, “Hadoop: The Definitive Guide”, Third Edition - O’Reilly , 2012.
4.	http://blog.matthewrathbone.com/2013/11/17/python-map-reduce-on-hadoop---a-beginners- tutorial.html
5.	http://www.michael-noll.com/tutorials/writing-an-hadoop-mapreduce-program-in-python/
6.	http://allthingshadoop.com/category/python/

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Overview of Data Analytics	1
1.2	Business Intelligence- Pattern Recognition	1
1.3	Data Processing Chain - BI for Better Decisions	1
1.4	Decision Types- BI Tools - BI Applications	1
1.5	Introduction to Big Data - Data analysis life cycle	1
1.6	Overview of popular programming tools (Python, R, SQL) for data analysis	1
1.7	Introduction to data visualization tools (Tableau, Power BI) and their significance	1
1.8	Understand the statistical concepts: descriptive and inferential statistics	1
1.9	summary statistics: mean, median, mode, range, standard deviation, quartiles and correlation	1
2.0	**Data Collection and Preprocessing**	
2.1	Introduction to Data Sources - Data Cleaning	2
2.2	Data Transformation - Normalization/Scaling	1
2.3	Log Transformation - Handling Categorical Data	1
2.4	One-Hot Encoding- Label Encoding	1
2.5	Dealing with Imbalanced Data - Handling Date and Time Data.	1
2.6	Feature Engineering- Removing Redundant Features - Data Integration	2
2.7	Handling Duplicate Data- Data Splitting - Data Standardization.	1
3.0	**Exploratory Data Analytics (EDA**	
3.1	Introduction, Data Visualization Techniques -Univariate, Bivariate, and Multivariate Plots	1
3.2	Selection of Appropriate Charts (Histograms, Box Plots, Scatter Plots)	2
3.3	Data Distribution Analysis: Normality Testing, Skewness and Kurtosis, Correlation and Covariance	1
3.4	Handling Outliers in EDA - Data Patterns and Trends: Time Series Analysis, Seasonality and Trends	2
3.5	Exploring Relationships: Heatmaps for Correlation, Pair Plots - Hypothesis Testing: Formulating Hypotheses and Selecting the Right Test (T-Tests,ANOVA)	2
3.6	Interactive EDA Tools: Use Tools like Tableau Power BI and create interactive Dashboards	1
4.0	**Statistical Data Analytics**	
4.1	Linear Regression	2
4.2	Logistic Regression	2
4.3	Multinomial Logistic Regression	1
4.4	Poisson Regression	1
4.5	Generalized Linear Models (GLM)	2
4.6	Time Series Models	1
5.0	**Distributed File Systems**	
5.1	Hadoop Distributed File System (HDFS) and Google File System (GFS).	2
5.2	NoSQL Databases: Explore distributed databases like Apache Cassandra, MongoDB, or Amazon DynamoDB. Distributed Processing	3
5.3	MapReduce programming model for distributed processing	2
5.4	Apache Spark framework for in-memory data processing	2

Course Designer(s)

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60 IT E31	Information Retrieval Techniques	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To study the basic retrieval techniques of information.
- To understand the basics of information retrieval with pertinence to modelling, query operations and indexing.
- To study dynamic approaches for information retrieval.
- To study the clustering and pattern matching methods.
- To study web search techniques catering retrieval process.

Pre-requisites

- Basic knowledge of DBMS and Web Technology.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Evaluate the performance of retrieval using algebraic and probabilistic models	Remember
CO2	Apply different types of queries to retrieve information	Understand
CO3	Compare various indexing and searching in retrieval and visualize it.	Analyse
CO4	Categorize complex indexing approach to retrieve data	Apply
CO5	Implement online IR systems and libraries to retrieve data	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	-	-	3	-	-	-	-	2	-	-	2	3	1
CO2	3	3	3	3	3	-	-	-	-	-	-	-	2	3	1
CO3	3	2	-	3	2	-	-	-	-	-	-	-	2	3	1
CO4	3	2	-	3	3	-	-	-	-	-	-	-	2	3	1
CO5	3	3	-	-	3	-	-	-	-	2	-	2	2	3	1
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	20	40
Apply	-	10	20
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E31- Information Retrieval Techniques								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval- Algebraic and Probabilistic Models – Retrieval Performance Evaluation	[9]
Query Languages and Operations Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations – User Relevance Feedback – Local and Global Analysis – Text and Multimedia languages.	[9]
Text Operations, Indexing and Searching* Document Preprocessing – Clustering – Text Compression - Indexing and Searching – Inverted files – Boolean Queries – Sequential searching – Pattern matching – User Interface and Visualization – Human Computer Interaction	[9]
Multimedia Models, Indexing and Searching Data Models – Query Languages - Spatial Access Methods – Generic Multimedia Indexing Approach - One Dimensional Time Series - Two Dimensional Color Images – Feature Extraction	[9]
Searching The Web and Libraries* Searching the Web - Challenges - Characterizing the Web - Search Engines - Browsing - Meta-searchers – Online IR systems - Digital Libraries – Architectural Issues – Document Models, Representations and Access.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Ricardo Baeza-Yate, Berthier Ribeiro-Neto, “Modern Information Retrieval”, Pearson Education Asia, 2nd Edition,2005.
2.	Christopher D. Manning, Prabhakar Raghavan, Hinrich Schutze,”Introduction to Information Retrieval”, Cambridge University Press, First South Asian Edition, 2008.
Reference(s):	
1.	G.G. Chowdhury, “Introduction to Modern Information Retrieval”, Neal-Schuman Publishers, 3rd edition, 2010.
2.	Daniel Jurafsky and James H. Martin, “Speech and Language Processing”, Pearson Education, 3rd edition,2023.
3.	David A. Grossman, Ophir Frieder, “Information Retrieval: Algorithms, and Heuristics”, Academic Press, 2nd edition, 2004.
4.	Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, “Text Information Retrieval Systems”, Academic Press, 2000.

*SDG 4 – Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Basic Concepts	1
1.2	Retrieval Process	1
1.3	Modelling	1
1.4	Classic Information Retrieval	2
1.5	Algebraic and Probabilistic Models	1
1.6	Retrieval Performance Evaluation	2
2.0	**Query Languages and Operations**	
2.1	Languages	2
2.2	Key Word Based Querying	1
2.3	Pattern Matching	1
2.4	Structural Queries	1
2.5	Query Operations	1
2.6	User Relevance Feedback	1
2.7	Local and Global Analysis	1
2.8	Text and Multimedia languages	1
3.0	**Text Operations, Indexing and Searching**	
3.1	Document Preprocessing	1
3.2	Clustering, Text Compression	1
3.3	Indexing and Searching	1
3.4	Inverted files	1
3.5	Boolean Queries	1
3.6	Sequential searching	1
3.7	Pattern matching	1
3.8	User Interface and Visualization	1
3.9	Human Computer Interaction	1
4.0	**Multimedia Models, Indexing and Searching**	
4.1	Data Models	1
4.2	Query Languages	1
4.3	Spatial Access Methods	1
4.4	Generic Multimedia Indexing Approach	2
4.5	One Dimensional Time Series	2
4.6	Two Dimensional Color Images	1
4.7	Feature Extraction	1
5.0	**Searching The Web and Libraries**	
5.1	Searching the Web, Challenges	1
5.2	Characterizing the Web	1
5.3	Search Engines	1
5.4	Browsing	1
5.5	Meta-searchers, Online IR systems	1
5.6	Digital Libraries	1
5.7	Architectural Issues	1
5.8	Document Models, Representations and Access	1

Course Designer(s)

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60 IT E32	Distributed Computing	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the foundation of distributed systems
- To learn issues related to clock Synchronization and the need for global state in distributed systems.
- To learn distributed mutual exclusion and deadlock detection algorithms.
- To understand the significance of agreement, fault tolerance and recovery protocols in Distributed systems.
- To understand the basics of cloud computing.

Pre-requisites

- Basic knowledge of Operating Systems.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Elucidate the foundations and issues of distributed systems.	Analyse
CO2	Understand the various synchronization issues and global state for distributed systems.	Apply
CO3	Use the Mutual Exclusion and Deadlock detection algorithms in distributed systems.	Apply
CO4	Describe the agreement protocols and fault tolerance mechanisms in distributed systems.	Analyse
CO5	Analyse the various services of cloud environment.	Analyse

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1	2	2	-	2	2	2	-	-	1	-	2	3	-
CO2	2	1	2	2	-	2	2	2	-	-	1	-	3	3	-
CO3	3	2	1	1	-	1	3	3	-	-	2	-	3	2	-
CO4	3	2	1	1	-	1	3	3	-	-	2	-	3	2	-
CO5	3	2	2	2	-	2	3	3	-	-	2	-	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	10	20
Apply	20	30	60
Analyse	10	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E32– Distributed Computing								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction Introduction: Definition-Relation to Computer System Components – Motivation – Message -Passing Systems versus Shared Memory Systems – Primitives for Distributed Communication – Synchronous versus Asynchronous Executions – Design Issues and Challenges; A Model of Distributed Computations: A Distributed Program – A Model of Distributed Executions – Models of Communication Networks – Global State of a Distributed System, Logical Time: Physical Clock Synchronization: NTP – A Framework for a System of Logical Clocks – Scalar Time – Vector Time.	[9]
Message Ordering and Snapshots* Message Ordering and Group Communication: Message Ordering Paradigms – Asynchronous Execution with Synchronous Communication – Synchronous Program Order on Asynchronous System – Group Communication – Causal Order – Total Order; Global State and Snapshot Recording Algorithms: Introduction – System Model and Definitions – Snapshot Algorithms for FIFO Channels.	[9]
Distributed Mutex and Deadlock** Distributed Mutual exclusion Algorithms: Introduction – Preliminaries – Lamport's Algorithm – Ricart-Agrawala's Algorithm — Token-Based Algorithms – Suzuki-Kasami's Broadcast Algorithm; Deadlock Detection in Distributed Systems: Introduction – System Model – Preliminaries – Models of Deadlocks – Chandy-Misra-Haas Algorithm for the AND Model and OR Model.	[9]
Consensus and Recovery* Consensus and Agreement Algorithms: Problem Definition – Overview of Results – Agreement in a Failure-Free System (Synchronous and Asynchronous) – Agreement in Synchronous Systems with Failures; Checkpointing and Rollback Recovery: Introduction – Background and Definitions – Issues in Failure Recovery – Checkpoint-based Recovery – Coordinated Checkpointing Algorithm – Algorithm for Asynchronous Checkpointing and Recovery	[9]
Cloud Computing** Definition of Cloud Computing – Characteristics of Cloud – Cloud Deployment Models – Cloud Service Models – Driving Factors and Challenges of Cloud – Virtualization – Load Balancing – Scalability and Elasticity – Replication – Monitoring – Cloud Services and Platforms: Compute Services – Storage Services – Application Services	[9]
Total Hours:	**45**

Text Book(s):

1. Kshemkalyani, Ajay D., and Mukesh Singhal, "Distributed computing: principles, algorithms and systems", Second Edition, Cambridge University Press, 2011
2. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education, 2012

Reference(s):

1. Arshdeep Bagga, Vijay Madisetti, "Cloud Computing: A Hands-On Approach", Fourth Edition, Universities Press, 2014.
2. Pradeep L Sinha, "Distributed Operating Systems: Concepts and Design", Fifth Edition, Prentice Hall of India, 2007.
3. Tanenbaum A S, Van Steen M, "Distributed Systems: Principles and Paradigms", Second Edition, Pearson Education, 2007.
4. Mukesh Singhal, Niranjan G Shivaratri, "Advanced Concepts in Operating systems", Third Edition, McGraw Hill Publishers, 1994.

*SDG 4 – Quality Education
**SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction**	
1.1	Introduction: Definition, Relation to Computer System Components	1
1.2	Motivation, Message, Passing Systems versus Shared Memory Systems	1
1.3	Primitives for Distributed Communication	1
1.4	Synchronous versus Asynchronous Executions, Design Issues and Challenges	1
1.5	A Model of Distributed Computations: A Distributed Program, A Model of Distributed Executions	1
1.6	Models of Communication Networks, Global State of a Distributed System	1
1.7	Logical Time: Physical Clock Synchronization: NTP	1
1.8	A Framework for a System of Logical Clocks	1
1.9	Scalar Time, Vector Time	1
2.0	**Message Ordering and Snapshots**	
2.1	Message Ordering Paradigms	1
2.2	Asynchronous Execution with Synchronous Communication	1
2.3	Synchronous Program Order on Asynchronous System	1
2.4	Group Communication	1
2.5	Causal Order	1
2.6	Total Order	1
2.7	Global State and Snapshot Recording Algorithms: Introduction	1
2.8	System Model and Definitions	1
2.9	Snapshot Algorithms for FIFO Channels.	1
3	**Distributed Mutex and Deadlock**	
3.1	Distributed Mutual exclusion Algorithms: Introduction, Preliminaries	1
3.2	Lamport's Algorithm	1
3.3	Ricart-Agrawala's Algorithm	1
3.4	Token-Based Algorithms	1
3.5	Suzuki-Kasami's Broadcast Algorithm	1
3.6	Deadlock Detection in Distributed Systems: Introduction	1
3.7	System Model, Preliminaries	1
3.8	Models of Deadlocks	1
3.9	Chandy-Misra-Haas Algorithm for the AND Model and OR Model	1
4	**Consensus and Recovery**	
4.1	Consensus and Agreement Algorithms: Problem Definition	1
4.2	Overview of Results	1
4.3	Agreement in a Failure-Free System (Synchronous and Asynchronous)	1
4.4	Agreement in Synchronous Systems with Failures	1
4.5	Checkpointing and Rollback Recovery: Introduction, Background and Definitions	1
4.6	Issues in Failure Recovery	1
4.7	Checkpoint-Based Recovery	1
4.8	Coordinated Checkpointing Algorithm	1
4.9	Algorithm for Asynchronous Checkpointing and Recovery	1
5	**Cloud Computing**	
5.1	Definition of Cloud Computing, Characteristics of Cloud	1
5.2	Cloud Deployment Models, Cloud Service Models	1
5.3	Driving Factors and Challenges of Cloud	1
5.4	Virtualization, Load Balancing	1

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5.5	Scalability and Elasticity, Replication	1
5.6	Monitoring, Cloud Services and Platforms	1
5.7	Compute Services	1
5.8	Storage Services	1
5.9	Application Services	1

Course Designer(s)

1. Mr. R.T.Dinesh Kumar – dineshkumarrt@ksrct.ac.in

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60 IT E33	Wireless Sensor Networks	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To grasp the fundamental knowledge of ad hoc networks and elements of routing protocols.
- To get familiar with sensor network architecture.
- To learn the physical and MAC layer protocols.
- To analyse the security issues of Sensor Network.
- To explore different platforms and tools for Sensor Network.

Pre-requisites

- Basic knowledge of computer networks

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Construct an Ad hoc networks and Wireless Sensor Networks	Understand
CO2	Implement a suitable routing algorithm based on the network and user requirement.	Apply
CO3	Identify appropriate physical and MAC layer protocols and its issues.	Analyse
CO4	Demonstrate the transport layer and security issues possible in Ad hoc and sensor networks.	Apply
CO5	Be familiar with the OS used in Wireless Sensor Networks and build basic modules.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1	1	1	1	2	-	2	2	2	-	2	3	2	1
CO2	2	1	1	1	2	2	-	2	2	2	1	2	3	1	1
CO3	3	2	1	1	2	2	-	2	2	3	2	2	3	2	2
CO4	3	3	2	1	2	2	-	2	3	3	2	2	3	1	2
CO5	3	2	1	1	2	2	-	2	3	3	2	2	3	1	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	20	50
Apply	20	10	20
Analyse		20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech. – Information Technology								
60 IT E33 – Wireless Sensor Networks								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Ad Hoc Networks : Introduction and Routing Protocols Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example Commercial applications of Ad hoc networking, Ad hoc wireless Internet, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols - Destination Sequenced Distance Vector (DSDV), On–Demand Routing Protocols – Ad hoc On – Demand Distance Vector Routing (AODV).	[9]
Sensor Networks : Introduction & Architectures * Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN Application Examples, Single - Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture - Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit	[9]
WSN Networking Concepts and Protocols * MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols and Wakeup Concepts - S-MAC, The Mediation Device Protocol, Contention Based Protocols - PAMAS, Schedule Based Protocols – LEACH, IEEE 802.15.4 MAC Protocol, Routing Protocols Energy Efficient Routing, Challenges and Issues in Transport Layer Protocol**.**	[9]
Sensor Network Security ** Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer Wise Attacks In Wireless Sensor Networks and Possible Solutions for Jamming, Tampering, Black Hole Attack, Flooding Attack. Key Distribution and Management, Secure Routing – SPINS, Reliability Requirements in Sensor Networks**.**	[9]
Sensor Network Platforms and Tools ** Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node - Level Software Platforms – TinyOS, nesC, CONTIKIOS, Node - Level Simulators – NS2 and its Extension to Sensor Networks, COOJA, TOSSIM, Programming beyond Individual Nodes – State Centric Programming.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Siva Ram Murthy C and Manoj B. S., “Ad Hoc Wireless Networks Architectures and Protocols”, Prentice Hall, PTR, Second Edition, 2022.
2.	Abdulrahman Yarali, “Wireless Sensor Networks (WSN): Technology and Applications”, Computer science Technology and publications, 2020.
Reference(s):	
1.	Feng Zhao, Leonidas Guibas, “Wireless Sensor Networks: an information processing approach”, Elsevier publication, 2022
2.	Charles E. Perkins, “Ad Hoc Networking”, Addison Wesley, 2021
3.	Akyildiz I.F., W. Su, Sankarasubramaniam, E. Cayirci, "Wireless sensor networks: a Survey, computer networks", Elsevier, 2012, 394 - 422.
4.	Holger Kerl, Andreas Willig, “Protocols and Architectures for Wireless Sensor Network”, John Wiley and Sons, 2005

*SDG 9 – Industry Innovation and Infrastructure
**SDG 11 – Sustainable Cities and Communities

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Ad Hoc Networks: Introduction And Routing Protocols**	
1.1	Elements of Ad hoc Wireless Networks	1
1.2	Issues in Ad hoc Wireless Networks	1
1.3	Example commercial applications of Ad hoc networking	1
1.4	Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks	1
1.5	Classifications of Routing Protocols	1
1.6	Table Driven Routing Protocols	1
1.7	Destination Sequenced Distance Vector (DSDV)	1
1.8	On–Demand Routing Protocols	1
1.9	Ad hoc On–Demand Distance Vector Routing (AODV).	
2.0	**Sensor Networks : Introduction & Architectures**	
2.1	Challenges for Wireless Sensor Networks	1
2.2	Enabling Technologies for Wireless Sensor Networks	1
2.3	WSN Application Examples	1
2.4	Single-Node Architecture	1
2.5	Hardware Components	1
2.6	Energy Consumption of Sensor Nodes	1
2.7	Network Architecture - Sensor Network Scenarios	1
2.8	Transceiver Design Considerations	1
2.9	Optimization Goals and Figures of Merit	1
3.0	**WSN Networking Concepts and Protocols**	
3.1	MAC Protocols for Wireless Sensor Networks	1
3.2	Low Duty Cycle Protocols and Wakeup Concepts	1
3.3	S-MAC	1
3.4	The Mediation Device Protocol	1
3.5	Contention Based Protocols - PAMAS	1
3.6	Schedule Based Protocols – LEACH	1
3.7	IEEE 802.15.4 MAC Protocol	1
3.8	Routing Protocols Energy Efficient Routing	1
3.9	Challenges and Issues in Transport layer protocol	1
4.0	**Sensor Network Security**	
4.1	Network Security Requirements	1
4.2	Issues and Challenges in Security Provisioning	1
4.3	Network Security Attacks	1
4.4	Layer Wise Attacks in Wireless Sensor Networks	1
4.5	Possible Solutions for Jamming, Tampering	1
4.6	Black Hole Attack, Flooding Attack	1
4.7	Key Distribution and Management	1
4.8	Secure Routing – SPINS	1
4.9	Reliability Requirements in Sensor Networks	1
5.0	**Sensor Network Platforms and Tools**	
5.1	Sensor Node Hardware – Berkeley Motes	1
5.2	Programming Challenges	1
5.3	Node-Level Software Platforms - Tinyos, Nesc,	1
5.4	Node-Level Software Platforms - CONTIKIOS	1

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5.5	Node-Level Simulators – NS2 and its Extension to Sensor Networks	1
5.6	Node-Level Simulators - COOJA	1
5.7	Node-Level Simulators - TOSSIM	1
5.8	Programming Beyond Individual Nodes	1
5.9	State Centric Programming	1

Course Designer(s)

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60 IT E34	Digital Image Processing	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the image fundamentals and steps in image processing.
- To learn the image enhancement models.
- To explore the image compression standards.
- To Analyse the image restoration and segmentation procedures.
- To understand the fundamentals of image representation and description.

Pre-requisites

- Basic knowledge of Integrals, Partial Differential Equations and Laplace Transform

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the fundamentals of digital image and the principles of color image processing.	Understand
CO2	Perform the image enhancement in spatial domain and enhance the image to a desired quality in frequency domain.	Understand
CO3	Implement the image compression models and different methods for lossy and lossless compression.	Understand
CO4	Examine the basics of image restoration and segmentation technique.	Analyse
CO5	Analyse the methods for image representation and description.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	1	1	2	-	-	-	1	1	-	1	-	-	2
CO2	2	2	1	1	2	-	-	-	1	1	-	1	-	-	2
CO3	2	2	1	1	2	-	-	-	1	1	-	1	-	-	2
CO4	2	2	1	1	2	-	-	-	1	1	-	1	-	-	2
CO5	2	2	1	1	2	-	-	-	1	1	-	1	-	-	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	20	40
Apply	-	10	10
Analyse	-	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022

B. Tech – Information Technology

60 IT E34– Digital Image Processing

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Digital Image Fundamentals * Introduction - Fields that use Digital Image Processing - Fundamental steps in Digital Image Processing: Elements of Visual Perception, Image Sampling and Quantization, Basic Relationship Between Pixels - Color Image Processing: Color Fundamentals and Models - File Formats - Image Operations **Hands - on:** Reading/ Writing of images and Basic Image Operations	[9]
Image Enhancement Spatial Domain Methods: Basic Grey Level Transformation - Histogram Equalization - Enhancement using Arithmetic/logic Operations - Spatial Filtering: Smoothing, Sharpening filters - Frequency Domain Methods: Filtering in Frequency Domain **Hands - on:** Implementation of Simple Spatial Filters	[9]
Image Compression and Wavelets * Fundamentals - Image Compression Models - Error Free Compression: Variable Length Coding, LZW Coding, Bit Plane Coding - Lossy Compression: Lossy Predictive Coding, Transform Coding, Wavelet Coding - Subband Coding - Image Compression Standards.	[9]
Image Restoration and Segmentation Noise Models – Mean Filters – Adaptive Filters - Notch Filters – Inverse Filtering – Wiener Filtering- Detection of Discontinuities – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation **Hands - on:** Implementation of Image Segmentation	[9]
Image Representation and Description Representation – Boundary Descriptors: Shape Numbers, Fourier descriptors, Statistical Moments – Regional Descriptors : Topological Descriptors, Texture – Relational descriptors - Patterns and Pattern Classes - Recognition Based On Matching	[9]
Total Hours:	**45**

Text Book(s):	
1.	Rafael C Gonzalez, Richard E. Woods, “Digital Image Processing”, Pearson Education, 4th Edition, 2018.
2.	William K Pratt,” Digital Image Processing”, CRC press, 2013.
Reference(s):	
1.	Jayaraman S., Veerakumar T., EsakkirajanS.,“Digital Image Processing”, Tata Mc Graw Hill Education, New Delhi, 2009.
2.	Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing Analysis and Machine Vision”, Fourth Edition, Cengage India, 2017
3.	Anil K. Jain, “Fundamentals of Digital Image Processing”, PHI, 2011.
4.	S.Sridhar, “Digital Image Processing”, Oxford University Press Higher Education,2016.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Digital Image Fundamentals**	
1.1	Introduction – Fields That Use Digital Image Processing	1
1.2	Fundamental Steps in Digital Image Processing	1
1.3	Elements of Visual Perception	1
1.4	Image Sampling and Quantization	1
1.5	Color Image Processing	1
1.6	Color Fundamentals and Models	1
1.7	File Formats – Image Operations	1
1.8	Reading/ Writing of Images and Basic Image Operations	2
2.0	**Image Enhancement**	
2.1	Spatial Domain Methods: Basic Grey Level Transformation	1
2.2	Histogram Equalization	1
2.3	Enhancement Using Arithmetic/Logic Operations	1
2.4	Spatial Filtering: Smoothing	1
2.5	Sharpening Filters	1
2.6	Frequency Domain Methods	1
2.7	Filtering in Frequency Domain	1
2.8	Implementation of Simple Spatial Filters	2
3.0	**Image Compression and Wavelets**	
3.1	Fundamentals - Image Compression Models	1
3.2	Error Free Compression: Variable Length Coding	1
3.3	LZW Coding, Bit Plane Coding	1
3.4	Lossy Compression: Lossy Predictive Coding	1
3.5	Transform Coding	1
3.6	Wavelet Coding	1
3.7	Subband Coding	1
3.8	Image Compression Standards	2
4.0	**Image Restoration and Segmentation**	
4.1	Noise Models – Mean Filters	1
4.2	Adaptive Filters	1
4.3	Notch Filters	1
4.4	Inverse Filtering	1
4.5	Wiener Filtering	1
4.6	Detection of Discontinuities	1
4.7	Edge Linking and Boundary Detection	1
4.8	Thresholding, Region Based Segmentation	1
4.9	Implementation of Image Segmentation	1
5.0	**Image Representation and Description**	
5.1	Representation	1
5.2	Boundary Descriptors: Shape Numbers	1
5.3	Fourier Descriptors	1
5.4	Statistical Moments	1
5.5	Regional Descriptors: Topological Descriptors	1
5.6	Texture	1
5.7	Relational Descriptors	1
5.8	Patterns and Pattern Classes	1
5.9	Recognition Based on Matching	1

Course Designer(s)

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60 IT E35	Blockchain Technologies	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand and explore the working of Blockchain technology.
- To Analyse the working of Smart Contracts.
- To understand and Analyse the working of Hyperledger.
- To apply the learning of solidity to build de-centralized apps on Ethereum.
- To develop applications on Blockchain.

Pre-requisites

- Basic knowledge of Internet.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand and explore the working of Blockchain technology	Understand
CO2	Analyse the working of Smart Contracts	Remember
CO3	Understand and Analyse the working of Hyperledger	Understand
CO4	Apply the learning of solidity to build de-centralized apps on Ethereum	Analyse
CO5	Develop applications on Blockchain	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	1	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	2	2	-	-	-	-	1	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	20	40
Apply	-	10	10
Analyse	-	10	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E35– Blockchain Technologies								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction of Cryptography and Blockchain Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures, Hashing, and Public Key Cryptosystems and Private vs. Public Blockchain.	[9]
Bitcoin and Cryptocurrency The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double- Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency.	[9]
Introduction to Ethereum* Introduction to Ethereum, Consensus Mechanisms, Metamask Setup, Ethereum Accounts, Transactions, Receiving Ethers, Smart Contracts.	[9]
Introduction to Hyperledger and Solidity Programming Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer. Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types.	[9]
Blockchain Applications Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Bikramaditya Singhal , Gautam Dhameja , Priyansu Sekhar Panda,“Beginning Blockchain: A Beginner'S Guide To Building Blockchain Solutions”, , A press 2022
2.	Chandramouli Subramanian|Asha A George|Abhilash K A|Meena Karthikeyan|Chandramouli Subramanian|Asha A George|Abhilash K A|Meena Karthikeyan “Blockchain Technology, , Universities Press (India) Pvt. Ltd.,2022
Reference(s):	
1.	Bylmran Bashir,”Mastering Blockchain: Inner workings of Blockchain, from Cryptography and Decentralized Identities, to DeFi, NFTs and Web3”, Packt Publishing, 4th Edition, 2022
2.	Kogan Page “Blockchain and the Supply Chain: Concepts, Strategies and Practical Applications”, 2021
3.	Rajdeep Chakraborty, Anupam Ghosh, Valentina Emilia Balas and Ahmed A. Elngar ,”Blockchain Principles and Applications in IoT”, Chapman & Hall, 2022

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Course Contents and Lecture Schedule		
S.No.	**Topic**	**No.of Hours**
1.0	**Introduction of Cryptography and Blockchain**	
1.1	Blockchain and its Usage	1
1.2	Blockchain Technology Mechanisms & Networks	1
1.3	Blockchain Origins, Objective of Blockchain	1
1.4	Blockchain Challenges	1
1.5	Transactions and Blocks	1
1.6	P2P Systems, Keys as Identity	1
1.7	Digital Signatures, Hashing, and Public Key Cryptosystems.	1
1.8	Private Blockchain.	1
1.9	Public Blockchain	1
2.0	**Bitcoin and Cryptocurrency**	
2.1	The Bitcoin Network	1
2.2	The Bitcoin Mining Process	1
2.3	Mining Developments, Bitcoin Wallets	1
2.4	Decentralization and Hard Forks	1
2.5	Ethereum Virtual Machine (EVM)	1
2.6	Merkle Tree, Double- Spend Problem	1
2.7	Blockchain and Digital Currency	1
2.8	Transactional Blocks	1
2.9	Impact of Blockchain Technology on Cryptocurrency	1
3.0	**Introduction to Ethereum**	
3.1	Ethereum in Banking	1
3.2	Introduction to Ethereum	1
3.3	Consensus Mechanisms	1
3.4	Metamask Setup	1
3.5	Ethereum Accounts	1
3.6	Transactions	1
3.7	Receiving Ethers	1
3.8	Smart Contracts – I	1
3.9	Smart Contracts – II	1
4.0	**Introduction to Hyperledger and Solidity Programming**	
4.1	Types of Hyperledger	1
4.2	Distributed Ledger Technology & its Challenges	1
4.3	Hyperledger & Distributed Ledger Technology	1
4.4	Hyperledger Fabric, Hyperledger Composer	1
4.5	Solidity - Language of Smart Contracts	1
4.6	Installing Solidity	1
4.7	Ethereum Wallet, Basics of Solidity	1
4.8	Layout of a Solidity Source File	1
4.9	Structure of Smart Contracts, General Value Types	1
5	**Blockchain Applications**	
5.1	Internet of Things	1
5.2	Web of Things	1
5.3	Medical Record Management System – I	1

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5.4	Medical Record Management System – II	1
5.5	Domain Name Service	1
5.6	Zones in DNS	1
5.7	DNS Registry	1
5.8	Future of Blockchain	1
5.9	Alt Coins	1
	Total	45

Course Designers

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60 IT E36	Web of Things	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To define the concept of Web of Things (WoT) and its key components.
- To recall the basic principles behind the integration of physical devices with web technologies.
- To recognize examples of WoT applications in real-world scenarios.
- To explain the significance of WoT in the context of the Internet of Things (IoT) ecosystem.
- To interpret the protocols and standards commonly used in WoT environments.

Pre-requisites

- Basic knowledge of Web Development

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply concept of Web of Things (WoT) and its key components	Remember
CO2	Develop programs using basic principles behind the integration of physical devices with web technologies.	Understand
CO3	Implement programs examples of WoT applications in real-world scenarios	Analyse
CO4	Create a solution based on the significance of WoT in the context of the Internet of Things (IoT) ecosystem	Analyse
CO5	Design layouts using protocols and standards commonly used in WoT environments.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	2	3	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	1	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	1	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	1	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	30	24
Understand	40	10	56
Apply	-	10	10
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology, Autonomous 2022

B. Tech - Information Technology

60 IT E36 Web of Things

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction to Web of Things Introduction to Web of Things (WoT): Understanding the Evolution from IoT - Differentiating IoT and WoT -Exploring Physical Devices in WoT Systems - Understanding the Architecture of WoT Systems - Components of WoT Architecture: Thing Description (TD) - Thing Interaction Model (TIM) - Communication Models in WoT - Hub-and-Spoke - Peer-to-Peer Significance and Applications of WoT - Examples and Impact across Different Domains	[9]
Understanding IOT and Web Technologies* Introduction to the Internet of Things (IoT)-Basics of Web Technologies- Challenges in Integrating Physical Devices with Web Technologies - Communication Protocols in IoT - Architecture of IoT Systems - Security and Privacy in IoT - Real-world Applications of IoT - Hands-on IoT Development - Group Project: IoT Application Development	[9]
WoT Solutions* WoT Applications in Smart Homes - WoT Solutions in Healthcare - Transportation and Urban Mobility - Industrial Automation and Industry 4.0 - Environmental Monitoring and Smart Cities - Wearable Technology and Personalized Health - Group Project: Designing WoT Applications - Ethical Considerations in WoT Adoption - Future Trends and Opportunities in WoT	[9]
Scalability* Understanding the Evolution of IoT to WoT - Defining Web of Things (WoT) - Key Components of WoT - Interoperability in IoT and the Role of WoT - Enhancing Connectivity with WoT Technologies - Improving User Experience through WoT - Scalability and Adaptability in WoT Systems- Security and Privacy Considerations in WoT - Future Trends and Opportunities in WoT	[9]
Interoperability and Future Trends Interoperability Challenges in IoT and the Role of WoT - Enhancing Connectivity with WoT Technologies: Protocols and Standards - Improving User Experience through WoT: Usability and Accessibility Considerations - Scalability and Adaptability in WoT Systems: - Challenges and Solutions - Security and Privacy Considerations in WoT Deployments - Impact of WoT on Industry Verticals: Case Studies and - Use Cases - Future Trends and Opportunities in WoT: Emerging - Technologies and Applications	[9]
Total Hours	45

Text Book(s):

1.	Dominique Guinard and Vlad Trifa, “Web of Things: Enabling Smart IoT Applications”, Manning Publications, 2021
2.	Dominique Guinard and Vlad Trifa, “Building the Web of Things: With Examples in Node.js and Raspberry Pi”, Manning Publications, 2022

Reference(s):

1.	Ivona Brandić, Dragan Stojanovic, “Interoperability and Open-Source Solutions for the Internet of Things: International Workshop, FP7 OpenIoT Project, Held in Conjunction with SoftCOM 2014”, Springer, 2022
2.	Rajkumar Buyya, Amir Vahid Dastjerdi “Internet of Things: Principles and Paradigms”, Morgan Kaufmann, 2023
3.	Pethuru Raj, Anupama Raman “IoT Platforms: Adoption Strategies and Emerging Ecosystems”, Apress, 2021

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Course Contents and Lecture Schedule		
S.No.	**Topic**	**No.of Hours**
1.0	**Introduction to Web of Things**	
1.1	Introduction to Web of Things (WoT)	1
1.2	Understanding the Evolution from IoT	1
1.3	Differentiating IoT and WoT	1
1.4	Exploring Physical Devices in WoT Systems	1
1.5	Understanding the Architecture of WoT Systems	1
1.6	Components of WoT Architecture: Thing Description (TD)	1
1.7	Thing Interaction Model (TIM)	1
1.8	Communication Models in WoT - Hub-and-Spoke, Peer-to-Peer	1
1.9	Significance and Applications of WoT, Examples and Impact across Different Domains	1
2.0	**Understanding IOT and Web Technologies**	
2.1	Introduction to the Internet of Things (IoT)	1
2.2	Basics of Web Technologies	1
2.3	Challenges in Integrating Physical Devices with Web Technologies	1
2.4	Communication Protocols in IoT	1
2.5	Architecture of IoT Systems	1
2.6	Security and Privacy in IoT	1
2.7	Real-world Applications of IoT	1
2.8	Hands-on IoT Development	1
2.9	Group Project: IoT Application Development	1
3.0	**WoT Solutions**	
3.1	WoT Applications in Smart Homes	1
3.2	WoT Solutions in Healthcare	1
3.3	Transportation and Urban Mobility	1
3.4	Industrial Automation and Industry 4.0	1
3.5	Environmental Monitoring and Smart Cities	1
3.6	Wearable Technology and Personalized Health	1
3.7	Group Project: Designing WoT Applications	1
3.8	Ethical Considerations in WoT Adoption	1
3.9	Future Trends and Opportunities in WoT	1
4.0	**Scalability**	
4.1	Understanding the Evolution of IoT to WoT	1
4.2	Defining Web of Things (WoT)	1
4.3	Key Components of WoT	1
4.4	Interoperability in IoT and the Role of WoT	1
4.5	Enhancing Connectivity with WoT Technologies	1
4.6	Improving User Experience through WoT	1
4.7	Scalability and Adaptability in WoT Systems	1
4.8	Security and Privacy Considerations in WoT	1
4.9	Future Trends and Opportunities in WoT	1
5.0	**Interoperability and Future Trends**	
5.1	Interoperability Challenges in IoT and the Role of WoT	1
5.2	Enhancing Connectivity with WoT Technologies: Protocols and Standards	1

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5.3	Improving User Experience through WoT:	1
5.4	Usability and Accessibility Considerations	1
5.5	Scalability and Adaptability in WoT Systems:	1
5.6	Challenges and Solutions - Security and Privacy Considerations in WoT	1
5.7	Deployments - Impact of WoT on Industry Verticals: Case Studies	1
5.8	Use Cases - Future Trends and Opportunities in WoT	1
5.9	Emerging Technologies and Applications	1
	Total	45

Course Designer(s)

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60 CS E47	Advanced .NET	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To gain knowledge in object-oriented concepts in C#
- To gain the fundamental skills of Model-View-Controller (MVC) in ASP.NET Core
- To understand the concepts of ASP.NET Core Web Application using Razor Pages
- To implement data manipulation using Razor pages
- To enhance the knowledge of Real-time Communication using C#

Pre-requisites

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the Object-Oriented concepts in C#	Understand
CO2	Integrate the concept of MVC in ASP.NET Core platform	Apply
CO3	Develop web pages using ASP.NET Core platform	Apply
CO4	Implement the data manipulation concept using Razor Pages	Apply
CO5	Implement the concept of Real-time Communication using C#	Apply

Mapping with Programme Outcomes

Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2	-	-	-	-	-	-	-	-	2	3	-	-
CO2	3	3	3	-	3	-	-	-	-	-	-	3	3	-	-
CO3	3	3	2	-	3	-	-	-	2	2	2	3	3	-	-
CO4	3	3	2	-	3	-	-	-	2	2	2	3	3	-	-
CO5	3	3	3	-	3	-	-	-	2	2	2	3	3	-	-

3 – Strong; 2 – Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	30
Apply	30	30	50
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B. Tech - Information Technology								
60 CS E47 - Advanced .NET								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Object-Oriented Programming in C#: Introduction to C#, Classes–Objects –Inheritance– Methods –Polymorphism –Interfaces – Operator Overloading – Delegates –Events–Errors–Exceptions–Collections–Managing File system.	[9]
Model-View-Controller (MVC) in ASP.NET Core:* Introduction to MVC – Setting up an ASP.NET Core MVC Website – MVC Routing – Controllers and Actions –Model – Views – Parameters Passing – View Helpers – Model Validation.	[9]
ASP.NET Core Web Application using Razor Pages:* Introduction to ASP.NET Core Web Application – Environment Setup – Project Layout – Static and Default Files - Enabling and Defining Razor Pages – Shared Layouts – Using code-behind files.	[9]
Data Manipulation using Razor Pages:* Introduction to ADO.NET-Database connectivity concept using ADO.NET – Connection Class with Authentication – Command Class – DataReader Class –DataAdapter Class – DataSet – OnGet –OnPost – OnPostDelete – OnPostEdit – OnPostView – REST API – Model and Controller for REST API.	[9]
Real-time Communication Limitations of traditional web communication - SignalR - Setting Up a SignalR Project - SignalR Hubs - Sending and Receiving Messages - Connection Management - Dependency Injection with SignalR - Building Real-Time Applications with SignalR.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Mark J. Price, “C# 8.0 and .NET Core 3.0 – Modern Cross-Platform Development”,4th Edition, Packt Publishing Limited, 2019.
2.	Dino Esposito, “Programming ASP.NET Core”, 1st Edition, Pearson Education Inc., 2018.
Reference(s) :	
1.	https://docs.microsoft.com/en-us/aspnet/core/
2.	Christian Nagel, “Professional C# 7 and .NET Core 2.0”, 1st Edition, Wiley Publication, 2018.
3.	Andrew Troelsen Phil Japikse,” Pro C# 8 with .NET Core 3: Foundational Principles and Practices in Programming”, Apress, 2020.
4.	Jon Skeet,” C# in Depth”,Fourth Edition, 2019.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Object-Oriented Programming in C#**	
1.1	Introduction to C#,	1
1.2	Classes–Objects –Inheritance	2
1.3	Methods –Polymorphism	1
1.4	Interfaces –Operator Overloading	1
1.5	Delegates –Events–Errors	2
1.6	Exceptions–Collections	1
1.7	Managing File system	1
2.0	**Model-View-Controller (MVC) in ASP.NET Core**	
2.1	Introduction to MVC	1
2.2	Setting up an ASP.NET Core MVC Website	1
2.3	MVC Routing – Controllers and Actions	2
2.4	Model – Views	2
2.5	Parameters Passing	1
2.6	View Helpers – Model Validation	2
3.0	**ASP.NET Core Web Application using Razor Pages**	
3.1	Introduction to ASP.NET Core Web Application	2
3.2	Environment Setup – Project Layout	2
3.3	Static and Default Files	1
3.4	Shared Layouts	2
3.5	Using code-behind files	2
4.0	**Data Manipulation using Razor Pages**	
4.1	Introduction to ADO.NET-Database connectivity concept using ADO.NET	2
4.2	Connection Class with Authentication	2
4.3	Command Class – DataReader Class	1
4.4	Data Adapter Class – DataSet	1
4.5	OnGet –OnPost OnPostDelete – OnPostEdit	2
4.6	OnPostView – REST API –Model and Controller for REST API.	1
5.0	**Real-time Communication**	
5.1	Limitations of traditional web communication	2
5.2	SignalR - Setting Up a SignalR Project	2
5.3	SignalR Hubs - Sending and Receiving Messages	2
5.4	Connection Management - Dependency Injection with SignalR	2
5.5	Building Real-Time Applications with SignalR	1

Course Designer(s)

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60 IT E41	Web Mining	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the basics of Information retrieval and web search with special emphasis on web crawling.
- To realize the use of machine learning approaches for web content mining.
- To understand the role of hyperlinks in web structure mining.
- To understand social media data using appropriate data/web mining techniques.
- To appreciate the various aspects of web usage mining.

Pre-requisites

- Basic knowledge of Web Page.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify the different components of a web page that can be used for mining.	Apply
CO2	Apply machine learning concepts to web content mining.	Apply
CO3	Design a system to collect information available on the web to build Recommender system.	Apply
CO4	Analyse social media data using appropriate data/web mining techniques.	Apply
CO5	Build a simple search engine using available open source tools.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	34
Understand	20	20	66
Apply	30	30	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

60 IT E41 – Web Mining

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction Introduction of WWW – Architecture of the WWW – Web Document Representation- Web Search Engine – Challenges - Web security Overview and Concepts, Web Application Security, Basic Web Security Model - Web Hacking Basics HTTP & HTTPS URL, Web Under the Cover Overview of Java security Reading the HTML Source.	[9]
Web Content Mining Web Content Mining – Supervised Learning – Learning - K-means Clustering – Hierarchical Clustering –Partially Supervised Learning – Markov Models - Probability-Based Clustering – Evaluating Classification and Clustering – Vector Space Model – Latent semantic Indexing – Automatic Topic Extraction - Opinion Mining and Sentiment Analysis – Document Sentiment Classification	[9]
Web Link Mining Web Link Mining – Hyperlink based Ranking – Introduction of Social Networks Analysis- Co-Citation and Bibliographic Coupling - Page Rank -Authorities and Hubs -Link-Based Similarity Search – Enhanced Techniques for Page Ranking - Community Discovery – Web Crawling -A Basic Crawler AlgorithmImplementation Issues- Universal Crawlers- Focused Crawlers- Topical Crawlers- Evaluation – Crawler Ethics and Conflicts - New Developments	[9]
Structured Data Extraction Structured Data Extraction: Wrapper Generation – Preliminaries- Wrapper Induction- Instance-Based Wrapper Learning ·- Automatic Wrapper Generation: Problems - String Matching and Tree Matching - Multiple Alignment - Building DOM Trees - Extraction Based on a Single List Page and Multiple pages Introduction to Schema Matching - Schema-Level Match -Domain and Instance-Level Matching – Extracting and Analyzing Web Social Networks	[9]
Web Usage Mining Web Usage Mining - Click Stream Analysis - Log Files - Data Collection and Pre-Processing - Data Modelling for Web Usage Mining - The BIRCH Clustering Algorithm - Modelling Web User Interests using Clustering- Affinity Analysis and the Priori Algorithm – Binning – Web usage Mining using Probabilistic Latent Semantic Analysis – Finding User Access Pattern via-Latent Dirichlet Allocation Model	[9]
Total Hours	**45**

Text Book(s):

1.	Matthew A. Russell, "Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More", Second edition 2022.
2.	Ian H. Witten, Eibe Frank, Mark A. Hall, and Christopher J. Pal , "Data Mining: Practical Machine Learning Tools and Techniques" Edition: Fourth Edition Year: 2020

Reference(s):

1.	Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, "Introduction to Data Mining" Fourth Edition Year: 2005
2.	Han, Micheline Kamber and Jian Pei, "Data Mining: Concepts and Techniques", Third 2020
3.	David J. Hand, Heikki Mannila, and Padhraic Smyth , "Principles of Data Mining"– Fifth Edition (2020)

* SDG-4 – Quality Education

* * SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**Introduction**	
1.1	Introduction of WWW	1
1.2	Architecture of the WWW	1
1.3	Web Document Representation, Web Search Engine	1
1.4	Challenges - Web security Overview And Concepts	1
1.5	Web Application Security,	1
1.6	Basic Web Security Model	1
1.7	Web Hacking Basics HTTP & HTTPS URL	1
1.8	Basics HTTP & HTTPS URL	1
1.9	Web Under the Cover Overview of Java security Reading the HTML source	1
2.0	**Web Content Mining**	
2.1	Web Content Mining , Supervised Learning	1
2.2	Learning - K-means Clustering	1
2.3	Hierarchical Clustering	1
2.4	Partially Supervised Learning, Markov Models	1
2.5	Probability-Based Clustering, Evaluating Classification and Clustering	1
2.6	Vector Space Model, Latent semantic Indexing	1
2.7	Automatic Topic Extraction	1
2.8	Opinion Mining and Sentiment Analysis	1
2.9	Document Sentiment Classification	1
3.0	**Web Link Mining**	
3.1	Web Link Mining, Hyperlink Based Ranking	1
3.2	Introduction of Social Networks Analysis	1
3.3	Co-Citation and Bibliographic Coupling	1
3.4	Page Rank ,Authorities and Hubs	1
3.5	Link-Based Similarity Search	1
3.6	Enhanced Techniques for Page Ranking	1
3.7	Community Discovery, Web Crawling	1
3.8	A Basic Crawler Algorithm Implementation Issues	1
3.9	Universal Crawlers, Focused Crawlers	1
4.0	**Structured Data Extraction**	
4.1	Structured Data Extraction, Wrapper Generation	1
4.2	Preliminaries, Wrapper Induction	1
4.3	Instance, Based Wrapper Learning	1
4.4	Automatic Wrapper Generation: Problems	1
4.5	String Matching and Tree Matching	1
4.6	Multiple Alignment, Building DOM Trees	1
4.7	Extraction Based on a Single List Page and Multiple pages Introduction to Schema Matching	1
4.8	Schema, Level Match, Domain and Instance	1
4.9	Extracting and Analyzing Web Social Networks	1
5.0	**Web Usage Mining**	
5.1	Web Usage Mining	1
5.2	Log Files - Data Collection and Pre-Processing	1
5.3	Data Modelling for Web Usage Mining	1

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5.4	The BIRCH Clustering Algorithm	1
5.5	Modelling Web User Interests using Clustering	1
5.6	Affinity Analysis and the Priori Algorithm	1
5.7	Binning – Web usage Mining using Probabilistic Latent Semantic Analysis	1
5.8	Finding User Access Pattern via-Latent Dirichlet Allocation Model	1
5.9	Click Stream Analysis	1
	Total	45

Course Designer(s)

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60 IT E42	Open Source Software	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Understand the concept of Open source.
- Be familiar with participating in a FOSS
- Overview OF MongoDB
- Creating web services of Node JS
- Learn some important RUST Programming

Pre-requisites

- Basic knowledge of Open Source Software, MongoDB, NodeJS and RUST Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Introduction to Open-Source Software	Apply
CO2	Use Different Methodologies	Apply
CO3	Build and modify MongoDB Operators, Database Commands and Connectivity	Apply
CO4	Use Web server NodeJS	Apply
CO5	Apply RUST Programming using C# Developers	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	34
Understand	20	20	66
Apply	30	30	-
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E42 – Open-Source Software								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction Open Source, Free Software, Free Software vs. Open-Source software, Public Domain Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project.	[9]
Methodologies OpenSourceHistory,Initiatives,Principleandmethodologies.Philosophy:SoftwareFreedom, Open Source Development Model Licenses and Patents: What is a License Important FOSS Licenses (Apache,BSD,GPL,LGPL), Copyrights and Copy Lefts, Patents Economics of FOSS:Zero MarginalCost, Income-Generation Opportunities, Problems with Traditional Commercial Software, Internationalization	[9]
Overview OF MongoDB MongoDB Operators, Database Commands, Database, Collection, CRUD : Documents, MongoDB Shell, MongoDB Cloud, MongoDB Tools, Connectivity	[9]
Node JS Introduction to Node JS, Setup Dev Environment, Node Package Mananger, Creating Web server, File System, Debugging Node JS Application, Events, Express.JS, Serving Static Resources, Database Connectivity	[9]
RUST Programming Introduction to Rust Programming, Comprehensive Rust, Rust for JavaScript/TypeScript Developers, Rust for C# Developers, Rust for Python Developers, Desktop Apps with Rust and Tauri, Web APIs with Rust and ActixWeb, Web Apps with Rust and Leptos, Memory Safe Programming with Rust	[9]
Total Hours	**45**

Text Book(s):	
1.	Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2020
2.	Martin C. Brown, “Node JS: The Complete Reference”, 2 Nd Edition, Tata McGraw-HillPublishing Company Limited, Indian Reprint 2018.
Reference(s):	
1.	Steven Holzner, “Rust Programming : The Complete Reference”, 2Nd Edition, Tata McGraw-HillPublishing Company Limited, Indian Reprint 2020.
2.	Vikram Vaswani, “MongaDB: The Complete Reference”, 2 Nd Edition, TataMcGraw-Hill Publishing Company Limited, Indian Reprint 2009.
3.	Rasmus Lerdorf and Levin Tatroe, “Open Source ”, 1ST Edition ,O’Reilly, 2002
4.	Zdravko Markov, “Open Source software, The Complete Reference”, 2Nd Edition, TataMcGraw-Hill Publishing Company Limited, Indian Reprint 2020.

* SDG-4 – Quality Education

* * SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Open Source	1
1.2	Free Software	1
1.3	Free Software vs. Open-Source software	1
1.4	Public Domain Software	1
1.5	FOSS does not Mean No Cost	1
1.6	History: BSD	1
1.7	The Free Software Foundation	1
1.8	The GNU Project	1
1.9	History: BSD	1
2.0	**Methodologies**	
2.1	Open-Source History, Initiatives	1
2.2	Principle and Methodologies	1
2.3	Philosophy: Software Freedom	1
2.4	Open-Source Development Model Licenses and Patents	1
2.5	What is a License Important FOSS Licenses (Apache, BSD, GPL,LGPL)	1
2.6	Copyrights and Copy Lefts, Patents Economics of FOSS: Zero Marginal Cost	1
2.7	Problems with Traditional Commercial Software	1
2.8	Regularization	1
2.9	Internationalization	1
3.0	**Overview Of MongoDB**	
3.1	MongoDB Operators	1
3.2	Database Commands	1
3.3	Database Collection	1
3.4	CRUD : Documents	1
3.5	MongoDB Shell	1
3.6	MongoDB Cloud	1
3.7	MongoDB Tools	1
3.8	MongoDB Connectivity	1
3.9	MongoDB Connectivity	1
4.0	**Node JS**	
4.1	Introduction to Node JS	1
4.2	Setup Dev Environment	1
4.3	Node Package Mananger	1
4.4	Creating Web Server	1
4.5	File System	1
4.6	Debugging Node JS Application	1
4.7	Events, Express.JS	1
4.8	Serving Static Resources	1
4.9	Database Connectivity	1
5.0	**RUST Programming**	
5.1	Introduction to Rust Programming	1
5.2	Comprehensive Rust	1
5.3	Rust for JavaScript/TypeScript Developers	1
5.4	Rust for C# Developers	1

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5.5	Rust for Python Developers,	1
5.6	Desktop Apps with Rust and Tauri,	1
5.7	Web APIs with Rust and ActixWeb	1
5.8	Web Apps with Rust and Leptos	1
5.9	Memory Safe Programming with Rust.	1
	Total	45

Course Designer(s)

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60 IT E43	High Performance Networks	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To provide insights about basic concepts in high performance networking, with a focus on throughput and latency performance metrics.
- To understand the advanced network technologies and ATM networks.
- To learn the transport layer protocols and congestion control mechanisms.
- To explore the concept of unicast and multicast routing protocols.
- To learn the working principles of network Management protocols and its application.

Pre-requisites

- Computer Networks

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Acquire Knowledge on concepts of high-performance networks.	Understand
CO2	Recognize the advanced networking technologies and ATM networks.	Understand
CO3	Explore the concepts of congestion control and transport layer protocols.	Understand
CO4	Attain solutions to various problems in network routing protocols.	Apply
CO5	Attain extensive knowledge on network management and its application.	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	2	2	2	-	2	2	2	-	2	3	3	-
CO2	3	3	3	2	2	2	-	2	2	2	-	2	3	3	-
CO3	3	3	3	2	2	2	-	2	2	2	-	2	3	3	-
CO4	3	3	3	3	3	2	-	2	2	2	-	2	3	2	-
CO5	3	3	3	3	3	2	-	2	2	2	-	2	3	2	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	30	60
Apply	-	10	10
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech. Information Technology								
60 IT E43- High Performance Networks								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

TCP/IP Networks* Standards and Administration - Internet Structure - ISPs and Backbone Networks - Internet Architecture - Key Requirements for Efficiency of Networks: Scalable Connectivity, Cost-Effective Resource Sharing, Support for Services, Manageability - Performance Parameters for High-Speed Networks; Application Performance Needs.	[9]
Network Technologies for High-Speed Networks*** Ethernet and its High speed versions – FDDI - Frame Relay Networks – SONET- DWDM – ATM - Design Goals - Architecture and Logical Connection - ATM Cells - Connection Establishment and Release – Switching - ATM Layers.	[9]
TCP/IP Transport Layer and Congestion Control* Client/Server Paradigm - Peer-to-Peer Paradigm - Port Numbers - TCP Connection - TCP Flow and Congestion Control–Congestion Avoidance Mechanisms: Decbit, Random Early Detection (RED) - Source-Based Congestion Avoidance, UDP Services And Applications, SCTP Services & Features.	[9]
Internet Routing Protocols*** Unicast Routing Protocols: RIP – OSPF- BGP - Multicast Routing and Protocols: DVMRP- MOSPF – PIM- MBGP- Mobile Adhoc Networks: Introduction - Table-Driven and On-Demand Routing Protocols.	[9]
Network Management and Application** Network Management- Choosing a Configuration Method-MIB-SNMP-XMLCORBA- COPS-VPNS-Mobile IP-Voice Over IP.	[9]
Total Hours:	**45**

Text Book(s):	
1.	George Varghese," Network algorithms". Chapman & Hall/CRC, 2010.
2.	Kaven Pahlavan And Prashant Krishnamoorthy, "Principles Of Wireless Network", Prentice Hall Of India, 2010
Reference(s):	
1.	Kurose, J.F. & Ross, K.W. (2009). Computer Networking: a Top-Down Approach. Addison-Wesley (5th ed.).
2.	Behrouz A. Forouzan, "TCP/IP Protocol Suite", 4thEdition, Tata McGraw Hill, 2015.
3.	Andrew S. Tanenbaum, "Computer Networks", 4th Edition, PHI, 2003.

*SDG 4-Quality Education
**SDG 9-Industry Innovation and Infrastructure
***SDG 11-Sustainable Cities and Communities

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**TCP/IP Networks**	
1.1	Standards and Administration	1
1.2	Internet Structure - ISPs and Backbone Networks	1
1.3	Internet Architecture	1
1.4	TCP/IP Protocol Suite	1
1.5	Key Requirements for Efficiency of Networks: Scalable Connectivity	1
1.6	Cost-Effective Resource Sharing	1
1.7	Support for Services, Manageability	1
1.8	Performance Parameters for High-Speed Networks	1
1.9	Application Performance Needs	1
2.0	**Network Technologies for High-Speed Networks**	
2.1	Ethernet and its High speed versions	1
2.2	FDDI - Frame Relay Networks	1
2.3	SONET- DWDM	1
2.4	ATM - Design Goals	1
2.5	Architecture and Logical Connection	1
2.6	ATM Cells	1
2.7	Connection Establishment and Release	1
2.8	Switching	1
2.9	ATM Layers	1
3.0	**TCP/IP Transport Layer and Congestion Control**	
3.1	Client/Server Paradigm	1
3.2	Peer-to-Peer Paradigm- Port numbers	1
3.3	TCP Connection	1
3.4	TCP Flow and Congestion Control	1
3.5	Congestion Avoidance Mechanisms: DECbit, Random Early Detection(RED)	1
3.6	Source-Based Congestion Avoidance	1
3.7	UDP Services and Applications	1
3.8	SCTP Services & Features	1
3.9	Network Layer Services	1
4.0	**Internet Routing Protocols**	
4.1	Unicast Routing Protocols : RIP	1
4.2	OSPF- BGP	1
4.3	Multicast Routing and Protocols: DVMRP	1
4.4	MOSPF	1
4.5	PIM	1
4.6	MBGP	1
4.7	Mobile Adhoc Networks: Introduction	1
4.8	Table-Driven Routing Protocols	1
4.9	On-Demand Routing Protocols	1
5.0	**Network Management And Application**	
5.1	Network Management	1
5.2	Configuration Method	1
5.3	MIB	1
5.4	SNMP	1
5.5	XML CORBA	1

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5.6	COPS	1
5.7	VPNS	1
5.8	Mobile IP	1
5.9	Voice over IP	1

Course Designer(s)

1. Dr.M.Sangeetha-sangeetham@ksrct.ac.in

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60 IT E44	Distributed Component Architecture	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the fundamentals of distributed component techniques.
- To identify different approaches to create and implement component using java and corba technologies.
- To gain knowledge on .net technologies for client server connection.
- To Analyse different COM techniques in .NET components and design a framework for component.
- To gain knowledge on assembly tools and testing tools.

Pre-requisites

- Web Technology

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recalling facts about distributed components techniques and callbacks.	Remember
CO2	Demonstrate Threads, Javans with its Events and Properties and archive files.	Understand
CO3	Identify and implement the CORBA Component Technology.	Analyse
CO4	Apply the .Net Based Component Technologies for client server connection.	Apply
CO5	Design the Distributed Component Framework and the Development Tools.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	2	-	-	-	-	-	2	-	3	3	2
CO2	3	3	3	2	2	-	-	-	-	-	2	2	3	3	2
CO3	3	3	3	2	2	-	-	-	2	-	-	-	3	3	2
CO4	3	3	3	2	2	-	-	2	-	2	-	-	3	3	2
CO5	3	3	3	2	2	-	-	-	-	-	-	-	3	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	10	20
Understand	30	20	30
Apply	-	20	40
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.TECH – Information Technology								
60 IT E44 – Distributed Component Architecture								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction Client/Server Computing- Building Blocks - Types of Servers and Clients- Types of Middleware Aspects of Client/Server Systems - Component Technology - Components- Definitions- Properties – Benefits - Components and Interfaces - Direct and Indirect Interfaces - Versions- Interfaces as Contracts - Callbacks- Component Architecture- Component Frameworks-Components and Middleware.	[9]
Java Based Component Technologies* Threads – Java Beans – Events and connections – Properties – Introspection – JAR files – Reflection – Object Serialization – Enterprise Java Beans – Distributed Object Models – RMI and RMI-IIOP – ORM.	[9]
Corba Component Technologies** The OMG way - System Object Model - CORBA Timeline - CORBA Architecture - ORB-Services Facilities- Portable Object Adapter - Business Objects - IIOP-Transport Mechanisms- IDL- CCM- CCM Container-Model Driven Architecture.	[9]
. Net Based Component Technologies * The Microsoft Way-Component Object Model- from COM, COM+, DCOM to .NET Framework Evolution-Web Services Technologies-XML,WSDL,UDDI,SOAP-Common Language Runtime-.NET Framework Class Library-ADO.NET,ASP.NET- Contexts–Reflection – Remoting.	[9]
Component Frameworks and Development Connectors – EJB containers –CLR Contexts and Channels – JAXB – Black Box Component Framework – Cross Development Environment – Component Oriented Programming – Component Design and Implementation Tools – Testing Tools - Assembly Tools – Open Source Framework.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Clemens szyperski, Dominik Gruntz and Stephan Murer ,"Component Software Beyond Object Oriented Programming", 5th Edition, Pearson Education,2021
2.	Robert Orfali,Dan Harkey,Jeri Edwards, "Client/ Server Survival Guide", 5th Edition, John Wiley Inc,2020.
Reference(s):	
1.	G.Sudha Sadasivam, "Component - Based Technology",4th Edition,Wiley India Pvt. Ltd, 2020.
2.	David Chappell, "Understanding .NET", Pearson Education Inc, 2019.
3.	Bill Burke, Richard Monson-Haefel, "Enterprise JavaBeans",7th Edition,O'Reilly, 2019
4.	Mowbray, "Inside CORBA", 4th Edition, Pearson Education, 2018

*SDG 9 – Industry Innovation and Infrastructure
**SDG 4 – Quality in Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Client/Server Computing	1
1.2	Types of Servers and Clients- Types of Middleware Aspects of Client/Server Systems	1
1.3	Component Technology-Components	1
1.4	Definitions- Properties	1
1.5	Benefits -Components and Interfaces	1
1.6	Direct and Indirect Interfaces- Interfaces as Contracts	1
1.7	Callbacks	1
1.8	Component Architecture- Component Frameworks	1
1.9	Components and Middleware	1
2.0	**Java Based Component Technologies**	
2.1	Threads	1
2.2	Java Beans – Events and Connections	2
2.3	Properties – Introspection	1
2.4	JAR files – Reflection	1
2.5	Object Serialization	1
2.6	Distributed Object Models	2
2.7	RMI and RMI-IIOP-ORM	1
3.0	**Corba Component Technologies**	
3.1	The OMG way - System Object Model	1
3.2	CORBA Timeline - CORBA Architecture	1
3.3	ORB-Services Facilities	1
3.4	Portable Object Adapter - Business Objects	2
3.5	IIOP-Transport Mechanisms	1
3.6	IDL	1
3.7	CCM	1
3.8	CCM Container-Model Driven Architecture	1
4.0	**. Net Based Component Technologies**	
4.1	The Microsoft Way	1
4.2	Component Object Model- From COM COM+, DCOM to .NET framework evolution	1
4.3	Web Services Technologies- XML	1
4.4	WSDL	1
4.5	UDDI,SOAP	1
4.6	Common Language Runtime-.NET Framework Class Library	1
4.7	ADO.NET,ASP.NET	1
4.8	Contexts	1
4.9	Reflection – Remoting	1
5.0	**Component Frameworks and Development**	
5.1	Connectors	1
5.2	EJB Containers	1
5.3	CLR Contexts and Channels	1
5.4	JAXB – Black Box Component Framework	1
5.5	Cross Development Environment	1
5.6	Component Oriented Programming	1
5.7	Component Design and Implementation Tools	1
5.8	Testing Tools	1
5.9	Assembly Tools – Open-Source Framework	1

Course Designer(s)

1. Mr.M.Thilakraj-mthilakraj@ksrct.ac.in

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60 IT E45	Database Security and Access Control	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- Describe and apply security policies on Databases.
- Understand authentication and password security.
- Know about application vulnerabilities.
- Understand about auditing techniques.

Pre-requisites

- Basic Knowledge of Database security and Access control.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Provide fundamentals of database security, access control techniques.	Remember
CO2	Prove that, only authorized user has access to the data and the data integrity is preserved	Understand
CO3	Analyse the data and identify the problems and ensure the data confidentiality.	Analyse
CO4	Design and implement secure database systems and the relevant algorithms to apply.	Apply
CO5	Assess the strengths and weaknesses of various access control models and to Analyse their behavior.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1	2	2	2	-	-	2	1	1	1	2	2	2
CO2	3	3	2	1	1	2	-	-	2	1	1	2	3	2	2
CO3	3	2	3	2	3	2	-	-	2	1	1	2	3	1	1
CO4	3	3	2	2	1	2	-	-	1	1	1	1	3	2	2
CO5	3	3	2	1	1	2	-	-	1	1	1	1	3	2	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	40	20	40
Apply	-	10	20
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus								
K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E45 – Database security and Access control								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Database Security Introduction to Database Security – Security in Information Technology - Importance of Data – Database Review - Identity Theft – Levels of Security – Human Level: Corrupt/Careless User, Network/User Interface, Database Application Program- Physical Level.	[9]
Authentication and Authorization Passwords, Privileges and Roles - Authentication – Operating System Authentication, Database Authentication, Network or Third-Party Authentication - Authorization – User Account Authorization, Database/Application Security - Limitations of SQL Authorization – Access Control in Application Layer - Oracle Virtual Private Database.	[9]
Application Vulnerabilities Application Vulnerabilities - Application Security – Owasp Top 10 Web Security Vulnerabilities - Broken Access Control, Broken Account/Session Management, Cross-Site Scripting (xss) Flaws, Buffer Overflows - SQL Injection Flaws, Improper Error Handling, Insecure Storage.	[9]
Securing Database to Database Communications* Monitor and Limit Outbound Communications – Secure Database Links – Protect Link Usernames and Passwords – Monitor Usage of Database Links – Secure Replication Mechanisms - Map and Secure All Data Sources and Sinks. Trojans – Four Types of Database Trojans.	[9]
Encrypting and Auditing the Data Encrypting Data in Transit – Encrypting Data At Rest – Auditing Architectures – Audit Trail – Architectures Of External Audit Systems - Archive Auditing Information – Secure Auditing Information – Audit the Audit System.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Ron Ben-Natan, “Implementing Database Security and Auditing: A Guide for DBAs, InformationSecurity Administrators and Auditors”, Published by Elsevier, 2019.
2.	Silvana Castano, “Database Security”, Published by Addison-Wesley, 2020.
Reference(s):	
1.	Alfred Basta, Melissa Zgola, Dana Bullaboy, Thomas L. Witlock SR, “Database Security”, Google Books, 2020.
2.	Silberschatz, Korth and Sudarshan, “Database System Concepts”, 6 th Edition, 2019.
3.	“Web application security scanners”, http:// www. Window security. com /software/Web-Application-Security
4.	“Database Security”, http: / / docs. oracle. com / cd / B19306_01 / server.102 /b14220/security.html

* SDG4 – Quality Education

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Course Contents and Lecture Schedule		
S. No	**Topic**	**No. of Hours**
1.0	**Database Security**	
1.1	Security in Information Technology	1
1.2	Importance of data, database review	1
1.3	Identity theft, Levels of security	1
1.4	Human level: Corrupt/careless User	1
1.5	Network/User Interface	1
1.7	Database application program	1
1.8	Physical level	1
1.9	Security in Information Technology	1
2.0	**Authentication and Authorization**	
2.1	Passwords, Privileges and Roles	1
2.2	Authentication, operating system authentication	1
2.3	Database authentication	1
2.4	Network or third-party authentication	1
2.5	Authorization, User Account authorization	1
2.6	Database/Application Security	1
2.7	Limitations of SQL Authorization	1
2.8	Access Control in Application Layer	1
2.9	Oracle Virtual Private Database	1
3.0	**Application Vulnerabilities**	
3.1	Application Vulnerabilities	1
3.2	Application Security	1
3.3	OWASP Top 10 Web Security Vulnerabilities	1
3.4	Broken access control	1
3.5	Broken account/session management	1
3.6	Cross-site scripting (XSS) flaws	1
3.7	Buffer overflows	1
3.8	SQL Injection flaws	1
3.9	Improper error handling, Insecure storage	1
4.0	**Securing Database to Database Communications**	
4.1	Monitor and limit outbound communications	1
4.2	Secure database links	1
4.3	Protect link usernames and passwords	1
4.4	Monitor Usage Of Database Links	1
4.5	Secure replication mechanisms	1
4.6	Map And Secure All Data Sources And Sinks.	1
4.7	Trojans	1
4.8	Four Types Of Database Trojans.	2
5.0	**Encrypting and Auditing the Data**	
5.1	Encrypting data in transit	1
5.2	Encrypting data at rest	1
5.3	Auditing architectures	1
5.4	Audit trail	1
5.5	Architectures of external audit systems	2
5.6	Archive auditing information	1
5.7	Secure auditing information	1
5.8	Audit the audit system	1
Course Designer Ms.S.Keerthana@ksrct.ac.in		

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60 IT E46	Business Intelligence	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To identify technology and processes associated with Business Intelligence framework
- To study the concepts of data warehousing and data Integration techniques
- To apply the multi-dimensional data modeling techniques and its business metrics
- To design an enterprise dashboard using open source/MS Office
- To understand the applications of BI and Cloud Computing

Pre-requisites

- Basic knowledge of Business Intelligence

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Design and implement OLTP, OLAP, data warehouse and BI concepts.	Apply
CO2	Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data.	Analyse
CO3	Outline the definitions, concepts, information visualization and techniques of multi-dimensional data modeling.	Understand
CO4	Design an enterprise dashboard using open source/MS Office and decision making	Analyse
CO5	Apply big data technologies in business intelligence using cloud computing and creating a new opportunity for entrepreneurship for analytics	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	2	-	-	-	-	-	-	3	-	-
CO2	2	2	-	-	-	-	1	-	-	-	-	-	-	2	-
CO3	2	1	-	-	-	-	-	-	-	2	-	-	-	-	1
CO4	2	2	-	1	-	-	-	2	-	-	1	-	-	-	-
CO5	2	2	-	-	2	-	-	-	2	-	-	1	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	30	20	20
Apply	20	20	20
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	10	10	10

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech-Information Technology								
60 IT E46 - Business Intelligence								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VII	3	0	0	45	3	40	60	100

Introduction Introduction to Digital Data - Introduction - Types of Data - Introduction to OLTP and OLAP- OLTP vs OLAP - Different OLAP Architectures - Data Models for OLTP and OLAP - OLAP Operations on Multidimensional Data - BI BI Definitions and Concepts - BI Component Framework - Data Warehousing Concepts and its Role in BI - BI Roles and Responsibilities - Business Intelligence Applications	[9]
Data Integration Introduction to Data Warehouse - Data Integration - Data Integration Technologies - Data Quality- Data Profiling - ---Kettle Software: Introduction to ETL using Pentaho Data Integration.	[9]
Multi-Dimensional Data Modeling Introduction - Data Modeling Basics – Types – Techniques - Fact and Dimension Tables - Dimensional Models - Introduction to Measures and Metrics - Introduction to Business Metrics and KPIs - KPI Usage in Companies - Creating Cubes using Microsoft Excel.	[9]
Enterprise Reporting Reporting Perspectives - Enterprise Reporting Characteristics - Malcolm Baldrige Framework -, Balanced Scorecard - Enterprise Dashboard - Balanced Scorecard vs. Enterprise Dashboard - Enterprise Reporting using MS Access / MS Excel.	[9]
BI Applications and Case Studies Understanding BI and Mobility - BI and Cloud Computing - BI for ERP System - Social CRM and BI - Case Study: Good Lift HealthCare group - TentoTen Retail Stores.	[9]
Total Hours:	**45**

Text Book(s):

1.	RN Prasad and Seema Acharya, “Fundamental of Business Analytics”, Wiley India, 2011.
2.	Wilfriend Grossman and Stefanie Rinderle-MA,” Fundamentals of Business Analytics”, Wiley India,2015

Reference(s):

1.	John Boyer, Bill Frank, Brian Green, Tracy Harris, and Kay Van De Vanter, “Business Intelligence Strategy: A Practical Guide for Achieving BI Excellence”, IBM Corporation, 2010.
2.	Swain Scheps, “Business Intelligence for Dummies”, Wiley Publishing Inc, 2008
3.	Cindi Howson, “Successful Business Intelligence: Secrets to making BI a killer App”, McGraw Hill,2008.
4.	https://learningenglish.britishcouncil.org/en/listening

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1	**Introduction**	
1.1	Introduction to Digital Data, Types of Data	1
1.2	Introduction to OLTP and OLAP, OLTP vs OLAP	1
1.3	Different OLAP Architectures	1
1.4	Data Models for OLTP and OLAP - OLAP Operations on Multidimensional Data	1
1.5	BI Definitions and Concepts	1
1.6	BI Component Framework	1
1.7	Data Warehousing Concepts and its Role in BI	1
1.8	BI Roles and Responsibilities	1
1.9	Business Intelligence Applications	1
2	**Data Integration**	
2.1	Introduction to Data Warehouse	1
2.2	Data Integration	1
2.3	Data Integration Technologies	1
2.4	Data Quality	1
2.5	Data Profiling	1
2.6	Introduction to Kettle Software	1
2.7	Kettle Software	1
2.8	Introduction to ETL	1
2.9	Introduction to ETL using Pentaho Data Integration.	1
3	**Multi-Dimensional Data Modeling**	
3.1	Introduction - Data Modeling Basics	1
3.2	Types – Techniques	1
3.3	Fact and Dimension Tables	1
3.4	Dimensional Models	1
3.5	Introduction to Measures and Metrics	1
3.6	Introduction to Business Metrics	1
3.7	KPIs	1
3.8	KPI Usage in Companies	1
3.9	Creating Cubes using Microsoft Excel	1
4	**Enterprise Reporting**	
4.1	Reporting Perspectives	1
4.2	Enterprise Reporting Characteristics	1
4.3	Malcolm Baldrige Framework	1
4.4	Balanced Scorecard	1
4.5	Enterprise Dashboard	1
4.6	Balanced Scorecard	1
4.7	Enterprise Dashboard	1
4.8	Enterprise Reporting using MS Access	1
4.9	Enterprise Reporting using MS Excel	1
5	**BI Applications and Case Studies**	
5.1	Introduction to BI Application	1
5.2	Understanding BI and Mobility	1
5.3	BI and Cloud Computing	1
5.4	BI for ERP System	1
5.5	Social CRM and BI	1

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5.6	Case Study: Good Lift HealthCare group	1
5.7	Case Study: Library System	1
5.8	Case Study: Hospital Management	1
5.9	TentoTen Retail Stores.	1
	Total Hours	**45**

Course Designer(s)

1. Mr.K.Saravanan (saravanank@ksrct.ac.in)

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60 CS E48	Cyber Security	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the cybercrime and its classification
- To impart the knowledge of cyber security challenges in modern devices
- To provide an ability to explore the tools and methods used in cybercrime
- To implement the various mobile platform security models
- To apply different mobile security testing in the mobile app development lifecycle

Pre-requisites

- NIL

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of Cybercrime	Understand
CO2	Explore the cyber security challenges in modern devices	Understand
CO3	Interpret the tools and methods used in cybercrime	Understand
CO4	Implement different mobile platform security models	Apply
CO5	Apply different mobile security testing in the mobile app development lifecycle	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	2	2	-	2	-	-	-	2	2	-	-
CO2	2	3	-	-	2	2	-	2	-	-	-	2	2	-	-
CO3	2	3	-	-	2	2	-	2	-	-	-	2	2	-	-
CO4	-	2	-	-	2	2	-	-	-	-	-	2	2	-	-
CO5	-	2	-	-	2	2	-	-	-	-	-	2	2	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	20
Understand	40	20	50
Apply	-	20	30
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 CS E48 – Cyber Security								
Semester	**Hours / Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	60	3	40	60	100

Introduction to Cybercrime* Cybercrime- definition and origins of the word- Cybercrime and information security - Classifications of cybercrime- Cybercrime and the Indian ITA 2000 - A Global Perspective on cybercrimes- Cloud Computing-Proliferation of Mobile and Wireless Devices- Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era.	[9]
Cyber Security Challenges in Modern Devices** Security Challenges Posed by Mobile Devices- Registry Settings for Mobile Devices - Authentication Service Security- Attacks on Mobile/Cell Phones - Mobile Devices: Security Implications for Organizations- Organizational Measures for Handling Mobile-Devices-Related Security Issues - Organizational Security Policies and Measures in Mobile Computing Era, Laptops.	[9]
Tools and Methods** Tools and Methods Used in Cybercrime, Proxy Servers and Anonymizers- Phishing - Password Cracking - Key loggers and Spywares, - Virus and Worms - Steganography – DoS and DDoS Attacks -SQL Injection, Buffer Over Flow - Attacks on Wireless Networks - Phishing, Identity Theft (ID Theft) - The Legal Perspectives - Cyberlaw: The Indian Context - The Indian IT Act - Introduction to Security Audit.	[9]
Mobile Platform Security Models** Android – iOSMobile platform security models – Detecting Android malware in Android markets.	[9]
Mobile Security Testing** Mobile platform internals – Security testing in the mobile app development lifecycle – Basic static and dynamic security testing – Mobile app reverse engineering and tampering– Assessing software protections.	[9]
Total Hours	45

Text Book(s):	
1.	Nina Godbole, Sunit Belapure, “Cyber Security”, Wiley India, New Delhi 2012.
2.	Harish Chander, “cyber laws & IT protection”, PHI learning pvt.ltd, 2012.
Reference(s):	
1.	Dhiren R Patel, “Information security theory &practice” ,PHI learning pvt ltd,2010
2.	MS.M.K.Geetha & Ms. Swapne Raman,C”yber Crimes and Fraud Management”, MACMILLAN,2012.
3.	Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, “Fundamental of Cyber Security: Principles, Theory and Practices”, BPB Publishers, Delhi,2017.
4.	William Stallings, “Network Security Essentials: Applications and Standards”, Prentice Hall, 4th edition, 2010.

*SDG 4 – Quality Education
**SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1.0	**INTRODUCTION TO CYBERCRIME**	
1.1	Cybercrime- definition and origins of the word	1
1.2	Cybercrime and information security	1
1.3	Classifications of cybercrime	1
1.4	Cybercrime and the Indian ITA 2000	1
1.5	A Global Perspective on cybercrimes	1
1.6	Cloud Computing	2
1.7	Proliferation of Mobile and Wireless Devices	1
1.8	Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era.	1
2.0	**CYBER SECURITY CHALLENGES IN MODERN DEVICES**	
2.1	Security Challenges Posed by Mobile Devices	2
2.2	Registry Settings for Mobile Devices	2
2.3	Authentication Service Security - Attacks on Mobile/Cell Phones	1
2.4	Mobile Devices: Security Implications for Organizations	1
2.5	Organizational Measures for Handling Mobile-Devices	1
2.6	Related Security Issues - Organizational Security Policies and Measures in Mobile Computing Era, Laptops.	2
3.0	**TOOLS AND METHODS**	
3.1	Tools and Methods Used in Cybercrime, Proxy Servers and Anonymizers	1
3.2	Phishing -Password Cracking	2
3.3	Key loggers and Spywares, - Virus and Worms	1
3.4	Steganography – DoS and DDoS Attacks	2
3.5	SQL Injection, Buffer Over Flow - Attacks on Wireless Networks	1
3.6	Phishing, Identity Theft (ID Theft) - The Legal Perspectives	1
3.7	Cyberlaw: The Indian Context - The Indian IT Act. Introduction to Security Audit	1
4.0	**MOBILE PLATFORM SECURITY MODELS**	
4.1	Android – iOSMobile platform security models	4
4.2	Detecting Android malware in Android markets	5
5.0	**MOBILE SECURITY TESTING**	
5.1	Mobile platform internals	2
5.2	Security testing in the mobile app development lifecycle	2
5.3	Basic static and dynamic security testing	2
5.4	Mobile app reverse engineering and tampering	2
5.5	Assessing software protections.	1

Course Designer(s)

1. Ms. B. Janani – janani@ksrct.ac.in

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60 IT E51	Intelligent Database Systems	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the concepts of intelligent database systems
- To learn about the semantic data models
- To understand the concepts knowledge-based systems with AI
- To design the architecture of knowledge-based systems
- To implement the various real-time applications in Intelligent Database System.

Pre-requisites

- Basic knowledge of database management systems.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concepts of Intelligent database	Understand
CO2	Make study of the Database installation then create the database with user and apply SQL	Apply
CO3	Understand the concepts of knowledge-based systems and apply with AI	Understand
CO4	Design and create the small applications	Apply
CO5	Analyse and implement for various real-time applications in Intelligent Database System.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	-	2	3	3	-	3	3	3	2
CO2	3	3	3	3	2	2	-	2	3	2	-	3	3	3	3
CO3	3	3	3	3	3	2	-	2	3	3	-	3	3	3	3
CO4	3	3	3	3	3	3	-	-	3	3	-	3	3	3	3
CO5	3	3	3	3	3	3	-	-	3	-	-	3	-	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	30
Understand	20	30	50
Apply	30	20	10
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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B.Tech – Information Technology								
60 IT E51 – Intelligent Database Systems								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction IDBS* * Informal Definition of the Domain - General Characteristics of IDBSs - Data Models and the Relational Data Model - A Taxonomy of Intelligent Database Systems - Guidelines for Using Intelligent Database Systems	[9]
Semantic Data Models* Introduction - Nested and Semantic Data Models –The Nested Relational Model - Semantic Models – Object-Oriented Approaches to Semantic Data Modelling – Basic Concepts of a Core Object-Oriented Data Model - Comparison with Other Data Models - Query Languages and Query Processing.	[9]
Knowledge-Based Systems-AI context Introduction of Knowledge-Based Systems - Characteristics and Classification of the Knowledge-Based Systems – The Resolution Principle - Deductive Database Systems – Basic Concepts- DATALOG Language - Deductive Database Systems and Logic Programming Systems—Differences	[9]
Advanced Knowledge-Based Systems Introduction - Architectural Solutions - The 'General Bridge' Solution - Extending a KBS with Components Proper to a DBMS - The 'Tight Coupling' Approach – Advanced Solutions: Introduction - A 'Knowledge Level' Approach to the Interaction with an IAS- TELOS.	[9]
Applications in IDBS Introduction - Temporal Databases - Temporal Data Models with Query Languages – Ontologies - Theoretical Foundations - Environments for Building Ontologies - Structured, Semi-Structured and Unstructured Data - Multimedia Database - Mediators – Application of Mediators to Heterogeneous Systems – Open Problems.	[9]
Total Hours:	**45**

Text Book(s):

1.	Elisa Bertino, Barbara Catania, GianPieroZarri, “Intelligent Database Systems”, Collection ACM Press, 2018.
2.	Ngoc ThanhNguyen, RadoslawKatarzyniak, and Shyi-MingChen (Eds.), "Advances in Intelligent Information and Database Systems ", Springer, 2010.

Reference(s):

1.	Zarri G, “Functional and semantic roles in a high-level knowledge representation language, Artificial Intelligence”, 2019.
2.	Zarri G “Representation and Management of Complex 'Narrative' Information Part II of Essays Dedicated to Yaacov Choueka on Language, Culture, Computation”, 2015.
3.	Bertolissi C and Fernandez M, “Distributed Event-Based Access Control, International Journal of Information and Computer Security”, 2009.
4.	Hemphill L. and J. Rhyne, “A Model for Knowledge Representation m Natural Language Query Systems, Research Report Laboratory RJ 2304(31046)”, IBM Research Laboratory, San Jose.

* SDG-4 – Quality Education
* * SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction IDBS**	
1.1	Informal Definition of the Domain	1
1.2	General Characteristics of Idbss	2
1.3	Data Models and the Relational Data Model	2
1.4	A Taxonomy of Intelligent Database Systems	2
1.5	Guidelines for using Intelligent Database Systems.	2
2.0	**Semantic Data Models**	
2.1	Introduction - Nested and Semantic Data Models	1
2.2	The Nested Relational Model	1
2.3	Semantic Models	1
2.4	Object-Oriented Approaches to Semantic Data Modelling	2
2.5	Basic Concepts of a Core Object-Oriented Data Model	1
2.6	Comparison with other Data Models	1
2.7	Query Languages and Query Processing.	2
3.0	**Knowledge-Based Systems-AI Context**	
3.1	Introduction of Knowledge-Based Systems	1
3.2	Characteristics and Classification of the Knowledge-Based Systems	1
3.3	The Resolution Principle	1
3.4	Deductive Database Systems	2
3.5	Basic Concepts- DATALOG Language	1
3.6	Deductive Database Systems and Logic Programming Systems	2
3.7	Differences of DDS And LPS	1
4.0	**Advanced Knowledge-Based Systems**	
4.1	Introduction - Architectural Solutions	2
4.2	The 'General Bridge' Solution	1
4.3	Extending a KBS With Components Proper to A DBMS	1
4.4	The 'Tight Coupling' Approach	2
4.5	Advanced Solutions: Introduction - a 'Knowledge Level' Approach to the Interaction with an IAS	1
4.6	TELOS	2
5.0	**Applications In IDBS**	
5.1	Introduction - Temporal Databases	1
5.2	Temporal Data Models with Query Languages	1
5.3	Ontologies - Theoretical Foundations	1
5.4	Environments for Building Ontologies	2
5.5	Structured, Semi-Structured and Unstructured Data	1
5.6	Multimedia Database	1
5.7	Mediators – Application of Mediators to Heterogeneous Systems	1
5.8	Open Problems	1
	Total	45

Course Designer(s)

1. Mr.R. Arunkumar - rarunkumar@ksrct.ac.in

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60 IT E52	XML Web Services	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the fundamental concepts of XML and its role in web services.
- To learn XML Schema for defining the structure of XML documents.
- To explore SOAP protocol and develop SOAP-based web services.
- To comprehend the principles of RESTful architecture and design RESTful APIs.
- To integrate XML web services into applications and address security and performance considerations.

Pre-requisites

- Basic programming knowledge, familiarity with XML, HTTP, TCP/IP concepts, and understanding of networking concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Describe the syntax and structure of XML documents and explain the role of XML in web services.	Understand
CO2	Create and validate XML documents using XML Schema and understand namespaces in XML.	Apply
CO3	Develop SOAP messages, implement SOAP-based web services, and consume SOAP services in various programming languages.	Apply
CO4	Design RESTful APIs, implement RESTful web services using HTTP methods, and consume RESTful services.	Analyse
CO5	XML web services into applications, apply security mechanisms, optimize performance, and handle errors effectively.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
CO2	3	3	3	2	3	-	2	2	2	2	2	2	3	3	3
CO3	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
CO4	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
CO5	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	10	10
Apply	30	30	30
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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K. S. Rangasamy College of Technology – Autonomous R2022								
B. Tech Information Technology								
60 IT E52– XML Web Services								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction to XML and Web Services Overview of XML – XML Syntax – XML Structure (Elements, Attributes, and Entities) - XML Namespaces and Their Importance in Web Services - Introduction to Web Services - Types of Web Services: SOAP, RESTful, XML-RPC - Benefits XML - Limitations of XML Web Services	[9]
XML Schema and Validation Introduction to XML Schema Definition (XSD) - Creating XML Schemas - Define the Structure of XML Documents - Validating XML Documents - Validating XML Documents Against XML Schemas - Understanding Namespaces in XML - Advanced XML Schema Concepts (e.g., Complex Types, Simple Types)	[9]
SOAP (Simple Object Access Protocol) Introduction to SOAP Protocol - Understanding SOAP (Envelopes, Headers, Bodies) - SOAP Bindings (HTTP, SMTP, etc.) - Creating SOAP Messages - Building SOAP Requests, Responses and Headers - Implementing SOAP - SOAP Web Services - Consuming SOAP Web Services - SOAP Using Various Programming Languages	[9]
RESTful Web Services* Introduction to REST - Principles of RESTful Architecture - Designing RESTful APIs - Resource Identification, Representation, and Manipulation - URI Design and RESTful URL Patterns - Implementing RESTful Web Services using HTTP Methods (GET, POST, PUT, DELETE) - Developing RESTful Services Using Frameworks - Consuming RESTful Web Services	[9]
Integration and Advanced Topics* Integrating XML Web Services into Applications - Security Considerations - Performance Optimization Techniques - Caching Strategies - Minimizing Overhead in XML-Based Communication - Handling Errors - Handling Exceptions - Emerging Trends - Future Directions	[9]
Total Hours:	**45**

Text Book(s):	
1.	Ron Schmelzer, Jason Bloomberg ,"XML and Web Services Unleashed"*, Sams Publishers - 2002
2.	David A. Chappell, O'Reilly Media, "Building Web Services with XML", Year: 2002
Reference(s):	
1.	F.P.Coyle, “XML, Web Services, and the Data Revolution”, Pearson Education.
2.	S. Graham and others, “Building web Services with Java”, 2nd Edition, Pearson Education.
3.	McGovern, et al., “Java web Services Architecture”, Morgan Kaufmann Publishers, 2005.
4.	Ron Schmelzer, Jason Bloomberg, "XML and Web Services Unleashed", Sams Publishers - 2002

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S.No.	Topics	No. of hours
1.0	**Introduction to XML and Web Services**	
1.1	Introduction to XML and Overview of XML	1
1.2	Understanding XML Syntax	1
1.3	Understanding XML Structure (Elements, Attributes, and Entities)	1
1.4	XML Namespaces and Their Importance in Web Services	1
1.5	Introduction to Web Services	1
1.6	Types of Web Services: SOAP, RESTful, XML-RPC	2
1.7	Benefits of XML Web Services	1
1.8	Limitations of XML Web Services	1
2.0	**XML Schema and Validation**	
2.1	Introduction to XSD	1
2.2	Creating XML Schemas	2
2.3	Define the Structure of XML Documents	1
2.4	Validating XML Documents	1
2.5	Validating XML Documents Against XML Schemas	2
2.6	Understanding Namespaces in XML	1
2.7	Advanced XML Schema Concepts (e.g., Complex Types, Simple Types)	
3.0	**SOAP (Simple Object Access Protocol)**	
3.1	Introduction to SOAP	1
3.2	Understanding SOAP (Envelopes, Headers, Bodies)	1
3.3	SOAP Bindings (HTTP, SMTP, etc.)	1
3.4	Creating SOAP Messages	1
3.5	Building SOAP Requests, Responses and Headers	1
3.6	Implementing SOAP	1
3.7	SOAP Web Services	1
3.8	Consuming SOAP Web Services	
3.9	SOAP Using Various Programming Languages	1
4.0	**RESTful Web Services**	1
4.1	Principles of RESTful Architecture	1
4.2	Designing RESTful APIs	1
4.3	Resource Identification, Representation, and Manipulation	1
4.4	URI Design and RESTful URL Patterns	1
4.5	Implementing RESTful Web Services Using HTTP Methods (GET, POST, PUT, DELETE)	1
4.6	Developing RESTful Services Using Frameworks	2
4.7	Consuming RESTful Web Services	1
4.8	Principles of RESTful Architecture	
5.0	**Integration and Advanced Topics**	
5.1	Integrating XML Web Services into Applications	1
5.2	Security Considerations	1
5.3	Performance Optimization Techniques	1
5.4	Caching Strategies	1
5.5	Minimizing Overhead in XML-Based Communication	1

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5.6	Handling Errors	1
5.7	Handling Exceptions	1
5.8	Emerging Trends	1
5.9	Future Directions	1
	Total	45

Course Designer(s)

1. Mr. V. SHIYAM – shiyamv@ksrct.ac.in

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60 IT E53	Social Network Analysis	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To formalize the different types of entities and relationships as nodes and edges and represent this information as relational data.
- To understand the fundamental concepts in analyzing the large-scale data that are derived from social networks.
- To understand the basic concepts and principles of different theoretical models of social networks analysis.
- To transform data for analysis using graph-based and statistics-based social network measures.
- To choose among social network designs based on research goals.

Pre-requisites

- Computer Network

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Plan and execute network analytical computations.	Understand
CO2	Implement mining algorithms for social networks	Apply
CO3	Analyse and evaluate social communities	Apply
CO4	Use social network analysis in behavior analytics	Apply
CO5	Perform mining on large social networks and illustrate the results	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	-	2	3	3	-	3	3	3	2
CO2	3	3	3	3	2	2	-	2	3	2	-	3	3	3	3
CO3	3	3	3	3	3	2	-	2	3	3	-	3	3	3	3
CO4	3	3	3	3	3	3	-	-	3	3	-	3	3	3	3
CO5	3	3	3	3	3	3	-	-	3	-	-	3	-	3	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	20	20
Apply	30	30	60
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E53 – Social Network Analysis								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Graph Theory and Structure* Algorithm : Breadth First Search (BFS), Strongly Connected Components (SCC), Weakly Connected Components (WCC) - First Set of Experiments - Second Set of Experiments - Degree Distributions - Number of Breadth First Searches – Exponent: Rank Exponent R, Out-Degree Exponent, O. Hop Plot Exponent, H. Eigen Exponent, E. Permutation Model.	[9]
Social Network Graph Analysis Social Network Exploration - Processing and Properties - Finding Overlapping Communities - Graph Nodes - Similarity Between Graph Nodes - Counting Triangles in Graphs - Neighbourhood Properties of Graphs - Pregel Paradigm - Apache Giraph Graph Processing System.	[9]
Information Diffusion In Social Networks* Strategic Network Formation: Game Theoretic Models for Network Creation, User Behavior in Social Networks - Information Diffusion in Graphs: Cascading Behavior, Spreading, Epidemics, Heterogeneous Social Network Mining, Influence Maximization, Outbreak Detection - Opinion Analysis on Social Networks: Contagion, Opinion Formation, Coordination and Cooperation.	[9]
Cascading in Social Networks* Cascading in Social Networks - Decision Based Models of Cascade - Collective Action - Cascade Capacity - Co-existence of Behaviours - Cascade Capacity with Bilinguality - Probabilistic Models of Cascade - Branching Process - Basic Reproductive Number.	[9]
Link Analysis & Community Detection Crawling – Searching - Web Spam Pages Strength of Weak Ties - Triadic Closure - Detecting Communities in a Network - Girvan-Newman Algorithm - Minimum Cut Trees - Tie Strengths in Mobile Communication Network - Exact Betweenness Centrality.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Stephen P. Borgatti, Martin G. Everett, and Jeffrey C ,"Analyzing Social Networks" , Johnson,2nd Edition, 2013
2.	Charles Kadushin ,"Understanding Social Networks: Theories, Concepts, and Findings",1st Edition, 2012
Reference(s):	
1.	Charu C. Aggarwal ,"Social Network Data Analytics", 1st Edition, 2011
2.	David Easley and Jon Kleinberg , "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", 1st Edition, 2010

*SDG 4 – Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Graph Theory and Structure**	
1.1	Breadth First Search (BFS)	1
1.2	Strongly Connected Components (SCC)	1
1.3	Weakly Connected Components (WCC)	1
1.4	First Set of Experiments and Second Set of Experiments	1
1.5	Degree Distributions	1
1.6	Number of Breadth First Searches	1
1.7	Rank Exponent R and Out-Degree Exponent	1
1.8	O. Hop Plot Exponent and H. Eigen Exponent	1
1.9	E. Permutation Model	1
2.0	**Social Network Graph Analysis**	
2.1	Social Network Exploration	1
2.2	Processing and Properties	1
2.3	Finding Overlapping Communities	1
2.4	Graph Nodes	1
2.5	Similarity Between Graph Nodes	1
2.6	Counting Triangles in Graphs	1
2.7	Neighbourhood Properties of Graphs	1
2.8	Pregel Paradigm	1
2.9	Apache Giraph Graph Processing System	1
3.0	**Information Diffusion in Social Networks**	
3.1	Strategic Network Formation: Game Theoretic Models for Network Creation	1
3.2	User Behavior in Social Networks	1
3.3	Information Diffusion in Graphs: Cascading Behavior	1
3.4	Spreading and Epidemics	1
3.5	Heterogeneous Social Network Mining	1
3.6	Influence Maximization	1
3.7	Outbreak Detection	1
3.8	Opinion Analysis on Social Networks: Contagion, Opinion Formation	1
3.9	Coordination and Cooperation	1
4.0	**Cascading in Social Networks**	
4.1	Cascading in Social Networks	1
4.2	Decision Based Models of Cascade	1
4.3	Collective Action	1
4.4	Cascade Capacity	1
4.5	Co-existence of Behaviours	1
4.6	Cascade Capacity with Bilinguality	1
4.7	Probabilistic Models of Cascade	1
4.8	Branching Process	1
4.9	Basic Reproductive Number	1
5.0	**Link Analysis & Community Detection**	
5.1	Crawling	1

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5.2	Searching Principle	1
5.3	Web Spam Pages Strength of Weak Ties	1
5.4	Triadic Closure	1
5.5	Detecting Communities in a Network	1
5.6	Girvan-Newman Algorithm	1
5.7	Minimum Cut Trees	1
5.8	Tie Strengths in Mobile Communication Network	1
5.9	Exact Betweenness Centrality	1

Course Designer(s)

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60 IT E54	Data Science with Python	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the fundamentals of the Python programming language.
- To gain knowledge about different machine learning algorithms and their applications.
- To learn how to create effective visualizations using Python libraries.
- To learn techniques for data acquisition and collection.
- To iterate on models for continuous improvement and optimization.

Pre-requisites

- Python Proficiency

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Examine data acquisition techniques in Python for gathering data from various sources, including files, databases, and web scraping.	Understand
CO2	Inspect methods for integrating data from multiple sources for analysis and decision-making.	Analyse
CO3	Investigate different types of visualizations and their applications in data analysis and storytelling.	Apply
CO4	Develop, evaluate, and deploy machine learning models for solving real-world problems, such as classification and regression.	Apply
CO5	Develop the skills to iteratively improve models based on feedback and real-time data for better decision-making and performance.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	20	20
Apply	20	30	50
Analyse	10	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information technology

60 IT E54 –Data Science with Python

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction to Python Overview of Data Science - Introduction to Python Programming Language- Python's Ecosystem for Data Science - Data Acquisition- Data Wrangling - Python Libraries – Python Packages - Getting Started with Python for Data Science.	[9]
Data Ingestion and Data Munging Data Pre-processing: Data Cleaning, Handling Missing Values, Data Transformation, Data Integration. Machine Learning: Introduction to Machine Learning - Supervised vs. Unsupervised Learning - Machine Learning Algorithms Linear Regression - Logistic Regression - Decision Trees - Random Forests-Support Vector Machines (SVM)-Naive Bayes- K-Nearest Neighbours (KNN)-Clustering Algorithms (K-means, Hierarchical Clustering).	[9]
Visualization Technique in Data Science * Introduction - Types of Visualizations - Data Visualization Libraries in Python - Creating Visualizations with Python Libraries- Best Practices in Data Visualization: Principles of Effective Visualization Design - Labelling and Annotating Plots - Colour Selection And Usage – Avoidance of Misleading Visualizations - A Story with Data through Visualization.	[9]
Problem Solving Data Acquisition and Collection - Data Pre-Processing and Cleaning - Exploratory Data Analysis (Eda)- Model Development - Model Evaluation - Deployment and Integration - Monitoring and Maintenance - Documentation and Reporting - Iterative Improvement.	[9]
Real-World Applications ** Predictive analytics - Customer Segmentation - Sentiment Analysis - Fraud Detection - Image Recognition. Case study: Pre-Process the Dataset - Understand Patterns and Correlations - The best Performing Model - The Model for Real-Time Prediction and Decision-Making.	[9]
Total Hours:	**45**

Text Book(s):

1.	Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython" Published by O'Reilly Media, Second Edition, November 14,2017.
2.	Andreas C. Müller and Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Published by O'Reilly Media, First Edition, September 26,2016.

Reference(s):

1.	Foster Provost and Tom Fawcett, "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking", Published by O'Reilly Media, First Edition.
2.	Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", Published by O'Reilly Media, First Edition.

*SDG 9 - Industry, Innovation, and Infrastructure

**SDG 8 - Decent Work and Economic Growth

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Python**	
1.1	Overview of Data Science	1
1.2	Introduction to Python programming language	1
1.3	Python's Ecosystem for Data Science	2
1.4	Data Acquisition	1
1.5	Data Wrangling	1
1.6	Python Libraries	1
1.7	Python Packages	1
1.8	Getting Started with Python for Data Science.	1
2.0	**Data Ingestion And Data Munging**	
2.1	Data Cleaning, Handling Missing Values,	1
2.2	Data Transformation, Data Integration	1
2.3	Introduction to Machine Learning, Supervised vs. Unsupervised Learning	1
2.4	Linear Regression, Logistic Regression	1
2.5	Decision Trees	1
2.6	Random Forests-Support Vector Machines (SVM)	1
2.7	Naive Bayes	1
2.8	k-Nearest Neighbours (kNN)	1
2.9	Clustering Algorithms (K-means, Hierarchical Clustering).	1
3.0	**visualization Technique in Data Science**	
3.1	Introduction, Types of Visualizations, Data Visualization Libraries in Python	2
3.2	Creating Visualizations with Python Libraries	1
3.3	Best Practices in Data Visualization	1
3.4	Principles of effective visualization design	1
3.5	Labeling and Annotating Plots	1
3.6	Color Selection and Usage	1
3.7	Avoidance of Misleading Visualizations	1
3.8	A Story with Data through Visualization	1
4.0	**Problem Solving**	
4.1	Data Acquisition and Collection	1
4.2	Data Preprocessing and Cleaning	1
4.3	Exploratory Data Analysis (EDA)	1
4.4	Model Development	1
4.5	Model Evaluation	1
4.6	Deployment and Integration	1
4.7	Monitoring and Maintenance	1
4.8	Documentation and Reporting	1
4.9	Iterative Improvement	1
5.0	**Real-World Applications**	
5.1	Predictive Analytics	1
5.2	Customer Segmentation	1
5.3	Sentiment Analysis	1

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5.4	Fraud Detection	1
5.5	Image Recognition	1
5.6	Pre-Process the Dataset	1
5.7	Understand Patterns and Correlations	1
5.8	The Best-Performing Model	1
5.9	The Model for Real-Time Prediction and Decision-Making	1

Course Designer(s)

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60 IT E55	Augmented Reality	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To impart the fundamental aspects and principles of AR/VR technologies.
- To know the internals of the hardware and software components involved in the development of AR/VR enabled applications.
- To learn about the graphical processing units and their architectures.
- To gain knowledge about AR/VR application development.
- To know the technologies involved in the development of AR/VR based applications.

Pre-requisites

- Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basic concepts of AR and VR	Understand
CO2	Understand the tools and technologies related to AR/VR	Understand
CO3	Know the working principle of AR/VR related Sensor devices	Apply
CO4	Design of various models using modeling techniques	Analyse
CO5	Develop AR/VR applications in different domains	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	3	-	-	-	2	2	1	2	2	1	2
CO2	3	2	2	1	3	-	-	-	3	2	2	3	3	1	2
CO3	3	3	2	2	3	-	-	-	3	2	1	2	3	2	2
CO4	3	3	3	2	3	-	-	-	3	2	2	3	3	2	2
CO5	3	3	3	3	3	-	-	-	3	3	3	3	3	3	3
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	10	10
Understand	30	10	20
Apply	-	30	60
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E55 – Augmented Reality								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction To Augmented Virtual Reality (Avr) Overview of AVR - AVR Technologies - History and Evolution - Key Concepts and Terminology - Applications of AVR in Various Industries - Challenges in AVR - Opportunities in AVR Development - Ethics and Societal Implications of AVR - Future Trends and Advancements.	[9]
AVR Hardware and Software* Hardware Components of AVR Systems - Sensors and Tracking Technologies - Display Devices - Interfaces - Input Devices and Interaction Techniques - Software Development Platforms - Programming Languages for AVR Development - Integration of Hardware and Software in AVR Systems - System Model.	[9]
Design Principles For AVR* Design Principle - Human-Centered Design Principles - User Experience (UX) Design - Interface Design Considerations - Immersive Storytelling Technique - Interaction Design for AVR Applications - Prototype - Testing in AVR Development - Accessibility Considerations in AVR Design.	[9]
AVR Development Tools And Techniques** Development Environments - 3D Modeling and Asset Creation Tools - Animation Techniques for AVR Content - Audio Design and Spatial Sound - Scripting - Coding for AVR Applications - Optimization - Performance Tuning in AVR Development - Collaborative Development Workflows for AVR Projects.	[9]
Advanced Topics in AVR** Advanced Rendering Techniques - Multi-User AVR Systems - Distributed AVR Systems - Artificial Intelligence and Machine Learning - Augmented Reality Cloud Services - Wearable and Mobile AVR Devices - Legal and Regulatory Aspects - Emerging Applications - Future Directions.	[9]
Total Hours:	**45**

Text Book(s):	
1.	John Smith ,"Augmented Virtual Reality: Concepts, Technologies, and Applications", 2nd Edition, Publication: XYZ Publishers, Year: 2021
2.	Helen Papagiannis, "Augmented Human: How Technology is Shaping the New Reality", Edition: 1st Edition, Publication: O'Reilly Media, Year: 2022
Reference(s):	
1.	Michael Johnson, “Designing for Virtual Reality: Principles and Practices", Edition: 1st Edition, Publication: XYZ Publishers, Year: 2020
2.	Billinghurst, M., & Kato, H. (Eds.),”Augmented Reality: Where We Will All Live. Springer” (2019).

* SDG 4 - Quality Education

** SDG 9 – Industry, Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Augmented Virtual Reality (AVR)**	
1.1	Overview of AVR	1
1.2	AVR Technologies	1
1.3	History and Evolution	1
1.4	Key Concepts and Terminology	1
1.5	Applications of AVR in Various Industries	1
1.6	Challenges in AVR	1
1.7	Opportunities in AVR Development	1
1.8	Ethics and Societal Implications of AVR	1
1.9	Future Trends and Advancements	1
2.0	**AVR Hardware and Software**	
2.1	Hardware Components of AVR Systems	1
2.2	Sensors and Tracking Technologies	1
2.3	Display Devices	1
2.4	Interfaces	1
2.5	Input Devices and Interaction Techniques	1
2.6	Software Development Platforms	1
2.7	Programming Languages for AVR Development	1
2.8	Integration of Hardware and Software in AVR Systems	1
2.9	System Model	1
3.0	**Design Principles for AVR**	
3.1	Design Principle	1
3.2	Human-Centered Design Principles	1
3.3	User Experience (UX) Design	1
3.4	Interface Design Considerations	1
3.5	Immersive Storytelling Technique	1
3.6	Interaction Design for AVR Applications	1
3.7	Prototype	1
3.8	Testing in AVR Development	1
3.9	Accessibility Considerations in AVR Design	1
4.0	**AVR Development Tools and Techniques**	
4.1	Development Environments	1
4.2	3D Modeling and Asset Creation Tools	1
4.3	Animation Techniques for AVR Content	1
4.4	Audio Design and Spatial Sound	1
4.5	Scripting	1
4.6	Coding for AVR Applications	1
4.7	Optimization	1
4.8	Performance Tuning in AVR Development	1
4.9	Collaborative Development Workflows for AVR Projects	1
5.0	**Advanced Topics in AVR**	

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5.1	Advanced Rendering Techniques	1
5.2	Multi-User AVR Systems	1
5.3	Distributed AVR Systems	1
5.4	Artificial Intelligence and Machine Learning	1
5.5	Augmented Reality Cloud Services	1
5.6	Wearable and Mobile AVR Devices	1
5.7	Legal and Regulatory Aspects	1
5.8	Emerging Applications	1
5.9	Future Direction	1
	Total	45

Course Designer(s)

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60 IT E56	Ethical Hacking	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the basics of computer based vulnerabilities.
- To explore different foot printing, reconnaissance and scanning methods.
- To expose the enumeration and vulnerability analysis methods.
- To understand hacking options available in Web and wireless applications.
- To explore the options for network protection.
- To practice tools to perform ethical hacking to expose the vulnerabilities.

Pre-requisites

- Computer Networks

Course Outcomes

On the successful completion of the course, students will be able to

CO1	To express knowledge on basics of computer-based vulnerabilities	Understand
CO2	To gain understanding on different foot printing, reconnaissance and scanning methods.	Apply
CO3	To demonstrate the enumeration and vulnerability analysis methods	Apply
CO4	To gain knowledge on hacking options available in Web and wireless applications.	Analyse
CO5	To acquire knowledge on the options for network protection.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
CO2	3	3	3	2	3	-	2	2	2	2	2	2	3	3	3
CO3	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
CO4	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
CO5	3	3	3	3	3	-	2	2	2	2	2	2	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	20	30
Understand	20	20	50
Apply	20	10	10
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

60 IT E56- Ethical Hacking

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Introduction* Ethical Hacking Overview - Role of Security and Penetration Testers .- Penetration-Testing Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The TransportLayer - The Internet Layer - IP Addressing .- Network and Computer Attacks - Malware -Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security.	[9]
Foot Printing, Reconnaissance And Scanning Networks Footprinting Concepts - Footprinting through Search Engines, Web Services, Social Networking Sites, Website, Email - Competitive Intelligence - Footprinting through Social Engineering -Footprinting Tools - Network Scanning Concepts – Port-Scanning Tools - Scanning Techniques -Scanning Beyond IDS and Firewall.	[9]
Enumeration and Vulnerability Analysis Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities -Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows- Linux OSVulnerabilities- Vulnerabilities of Embedded OSS.	[9]
System Hacking** Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network –Wardriving- Wireless Hacking - Tools of the Trade.	[9]
Network Protection Systems*** Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems – NetworkBased and Host-Based IDSs and IPSs - Web Filtering - Security Incident Response Teams –Honeypots.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Michael T. Simpson, Kent Backman, and James E. Corley, “Hands-On Ethical Hacking and Network Defense, Course Technology”, Delmar Cengage Learning, 2010.
2.	Patrick Engebretson, SYNGRESS,”The Basics of Hacking and Penetration Testing”,Elsevier, 2013
Reference(s):	
1.	Dafydd Stuttard and Marcus ,“The Web Application Hacker’s Handbook : Finding and Exploiting Security Flaws”, Pinto, 2011
2.	Black Hat “Python: Python Programming for Hackers and Pentesters” Justin Seitz , 2014.

*SDG 4 – Quality Education
**SDG 8 – Decent Work and Economic Growth
***SDG 16 – Peace, Justices and Strong Institutions

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Ethical Hacking Overview	1
1.2	Role of Security and Penetration Testers	1
1.3	Penetration-Testing Methodologies- Laws of the Land	1
1.4	Overview of TCP/IP- The Application Layer - The TransportLayer	1
1.5	The Internet Layer - IP Addressing	1
1.6	Network and Computer Attacks - Malware	2
1.7	Protecting Against Malware Attacks.- Intruder Attacks	1
1.8	Addressing Physical Security	1
2.0	**Foot Printing, Reconnaissance and Scanning Networks**	
2.1	Footprinting Concepts	1
2.2	Footprinting through Search Engines, Web Services, Social Networking Sites, Website, Email	2
2.3	Competitive Intelligence	1
2.4	Footprinting through Social Engineering -Footprinting Tools	2
2.5	Network Scanning Concepts	1
2.6	Port-Scanning Tools	1
2.7	Scanning Techniques -Scanning Beyond IDS and Firewall	1
3.0	**Enumeration and Vulnerability Analysis**	
3.1	Enumeration Concepts - NetBIOS Enumeration	1
3.2	SNMP, LDAP, NTP, SMTP and DNS Enumeration	1
3.3	Vulnerability Assessment Concepts	1
3.4	Desktop and Server OS Vulnerabilities	2
3.5	Windows OS Vulnerabilities	1
3.6	Tools for Identifying Vulnerabilities in Windows	1
3.7	Linux OSVulnerabilities	1
3.8	Vulnerabilities of Embedded OSS	1
4.0	**System Hacking**	
4.1	Hacking Web Servers	1
4.2	Web Application Components	1
4.3	Vulnerabilities	1
4.4	Tools for Web Attackers and Security Testers Hacking Wireless Networks	2
4.5	Components of a Wireless Network	1
4.6	Wardriving	1
4.7	Wireless Hacking	1
4.8	Tools of the Trade.	1
5.0	**Network Protection Systems**	
5.1	Access Control Lists	1
5.2	Cisco Adaptive Security Appliance Firewall	1
5.3	Configuration and Risk Analysis Tools for Firewalls and Routers	1
5.4	Intrusion Detection and Prevention Systems	1
5.5	NetworkBased and Host	1
5.6	Based IDSs and IPSs	1
5.7	Web Filtering	1
5.8	Security Incident Response Teams	1
5.9	Honeypots	1

Course Designer(s)

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60 IT L01	Python Programming	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To know the basics of programming in python
- To understand modules, functions, exceptions and file handling
- To recognize the real world fact using Object Oriented concepts
- To recognize the basic concepts of Database and Network Connectivity
- To create layouts using graphical tools

Pre-requisites

- Basics knowledge of mathematics and programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Apply the basics of Python programming for problem-solving	Apply
CO2	Develop programs using modules, functions, exceptions and file handling	Apply
CO3	Implement programs using OOPS concept	Apply
CO4	Create a solution for real world problems using Database and Network connectivity.	Analyse
CO5	Design layouts with GUI toolkits using Tkinter and Turtle	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	-	10
Understand	20	20	20
Apply	20	20	40
Analyse	-	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 IT L01 – Python Programming								
IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Introduction Introduction to Python - Strings - List - Tuples - Dictionaries – Basic Operators - File Input and Output – Decision Making – Loops.	[9]
Modular Design and Exception Handling Modules - Python module - Namespaces - Importing modules – Loading and Execution – Program Routine – Functions – Parameter Passing - Types – Recursion –Exceptions – Types - Handling Exceptions	[9]
Object Oriented Programming Object Oriented Programming - Class and Objects - Data Abstraction - Encapsulation –Inheritance – Polymorphism	[9]
Database Programming and Network Programming** Introduction to database – DBM dictionaries - Relational Databases : Writing SQL statements; Defining tables; Setting up a Database - Python database APIs – Network Protocols - Socket Programming - Client Server Program - Chat Application	[9]
GUI Programming and Graphics* GUI Programming toolkits – Introduction to Tkinter – Creating GUI widgets - Resizing - Configuring widget options – Creating Layouts – Radio buttons – Check boxes – Dialog boxes – Drawing using Turtle	[9]
Total Hours:	**45**

Text Book(s):	
1.	James Payne, “Beginning Python – using Python 2.6 and Python 3.1”, Wiley India Pvt Ltd, 2010.
2.	Charles Dierbach, “Introduction to Computer Science using Python”, Wiley India Pvt Ltd, 2015.
Reference(s):	
1.	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education, 2013.
2.	John Paul Mueller, “Beginning Programming with Python”, Wiley India Pvt Ltd, 2014.
3.	Allen Downey, Jeffrey Elkner, Chris Meyers, “Learning with Python”, DreamTech Press, 2015.
4.	Dr. Nageswara Rao R. “Core Python Programming”, DreamTechPress,Second Edition,2018

*SDG 4 – Quality in Education

**SDG 8 – Employment and decent work to all

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Introduction to Python	1
1.2	Basic Data Types	1
1.3	Strings	1
1.4	List	1
1.5	Tuples	1
1.6	Dictionaries	1
1.7	Basic Operators	1
1.8	Decision Making Statements	1
1.9	Looping Statements	1
2.0	**Modular Design**	
2.1	Modules	1
2.2	Python module	1
2.3	Namespaces	1
2.4	Importing Modules	1
2.5	Loading and Execution	1
2.6	Program Routine, Functions	1
2.7	Parameter Passing, Types	1
2.8	Recursion, Exceptions	1
2.9	Types, Handling Exceptions	1
3.0	**Object Oriented Programming**	
3.1	Object Oriented Programming	1
3.2	Class	1
3.3	Objects	1
3.4	Class Types	1
3.5	Data Abstraction	1
3.6	Encapsulation	1
3.7	Inheritance	1
3.8	Inheritance Types	1
3.9	Polymorphism	1
4.0	**Database Programming and Network Programming**	
4.1	Introduction to Databases	1
4.2	DBM Dictionaries	1
4.3	Relational Databases	1
4.4	Writing SQL Statements, Defining Tables	1
4.5	Setting up a Database	1
4.6	Python Database APIs	1
4.7	Network Protocols	1
4.8	Socket Programming	1
4.9	Client Server Program, Chat Application	1
5.0	**GUI Programming and Graphics**	
5.1	GUI Programming toolkits	1
5.2	Introduction to Tkinter	1

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5.3	Creating GUI widgets	1
5.4	Resizing	1
5.5	Configuring Widget Options	1
5.6	Creating Layouts	1
5.7	Radio Buttons & Check Boxes	1
5.8	Dialog Boxes	1
5.9	Drawing using Turtle	1

Course Designer(s)

1. Dr.C.Nallusamy - nallusamyc@ksrct.ac.in
2. Mr.R.T.Dineshkumar-dineshkumarrt@ksrct.ac.in

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60 IT L02	Android App Development	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To appreciate the Mobility landscape and familiarize with Mobile apps development aspects
- To design and develop mobile apps using android as development platform with key focus on user experience design.
- To facilitate students to understand android SDK
- To gain basic understanding of android application development
- To inculcate working knowledge of android studio development tools

Pre-requisites

- Basics knowledge of java programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify various concepts of mobile programming that make it unique from programming for other platforms	Apply
CO2	Critique mobile applications on their design pros and cons	Apply
CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces	Apply
CO4	Develop mobile applications for the Android operating system that use basic and advanced phone features	Apply
CO5	Deploy applications to the Android marketplace for distribution.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	2	-	2	2	2	2	2	2	3	3	3
CO2	3	3	3	2	2	-	2	2	2	2	2	2	3	3	3
CO3	3	3	3	2	2	2	-	2	2	2	2	2	3	3	3
CO4	3	3	3	2	2	2	-	2	2	2	2	2	3	3	3
CO5	3	3	3	2	2	2	2	2	2	2	2	2	3	3	3
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	10	20
Apply	30	30	60
Analyse	-	-	-
Evaluate	-	-	-
Create	-	10	10
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 IT L02 – Android App Development								
IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	3	0	0	45	3	40	60	100

Introduction to Android The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android Application, Understanding Anatomy of Android Application, Android Manifest file.	[9]
Android Application Design Essentials* Anatomy of an Android Applications, Android Terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its Common Settings, Using Intent Filter, Permissions.	[9]
Android User Interface Design Essentials* User Interface Screen Elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.	[9]
Testing Android applications Publishing Android application, Using Android Preferences, Managing Application Resources in a Hierarchy, Working with Different Types of Resources.	[9]
Using Common Android APIs Using Android Data and Storage APIs, Managing Data using Sqlite, Sharing Data between Applications with Content Providers, using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, and Deploying Android Application to the World.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Anubhav Pradhan, AnilV Deshpande, “Composing Mobile Apps: Learn/Explore/Apply/ Using Android”,Wiley India Private Limited, 4th Edition,2022
2.	Joseph AnnuzziJr., LaurenDarcey, Shane Conder, “Introduction to Android Application Development: AndroidEssentials, Developer's Library”, Addison-Wesley Professional, 5th Edition, 2021.
Reference(s):	
1.	Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd,2019
2.	Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd,2018
3.	Barry Burd,”Android Application Development All in one for Dummies “, 2017
4.	**https://developer.android.com/courses**

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Android**	
1.1	The Android Platform	1
1.2	Android SDK	1
1.3	Eclipse Installation	1
1.4	Android Installation	1
1.5	Building you First Android application,	2
1.6	Understanding Anatomy of Android Application	2
1.7	Android Manifest File.	1
2.0	**Android Application Design Essentials**	
2.1	Anatomy of an Android Applications	1
2.2	Android Terminologies	1
2.3	Application Context	1
2.4	Activities	1
2.5	Services	1
2.6	Intents, Receiving and Broadcasting Intents	1
2.7	Android Manifest File and its Common Settings	1
2.8	using Intent Filter	1
2.9	Permissions	1
3.0	**Android User Interface Design Essentials**	
3.1	User Interface Screen elements	3
3.2	Buttons	3
3.3	Text fields	3
3.4	Radio Buttons	1
3.5	Progress Bar	1
3.6	Designing User Interfaces with Layouts, Linear Layout	1
3.7	Relative Layout ,Frame & Table	1
3.8	Constraint Layout	1
3.9	Drawing and Working with Animation	1
4.0	**Testing Android applications**	
4.1	Publishing Android Application	1
4.2	Application Rating	1
4.3	Target Region	1
4.4	Build and Upload apk Release	1
4.5	Using Android Preferences	1
4.6	Managing Application Resources in a Hierarchy	1
4.7	Group Resources Type	1
4.8	Provide Alternate Resources	1
4.9	Working with DIfferent Types of Resources.	1
5.0	**Using Common Android APIs**	
5.1	Using Android Data and Storage APIs	1
5.2	Managing Data using Sqlite,	1
5.3	Sharing Data between Applications with Content Providers	1

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5.4	Using Android Networking APIs	2
5.5	Using Android Web APIs	1
5.6	Using Android Telephony APIs	2
5.7	Deploying Android Application to the World	1

Course Designer(s)

1. Mr.M.Thilakraj - mthilakraj@ksrct.ac.in

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60 IT L03	Power BI	Category	L	T	P	Credit
		OE	1	0	4	3

Objectives

Understand the concept of Power BI
Be familiar with Microsoft Data Analytics
Develop a Data with Power BI
Apply Sematic Model in Power BI
Learn some important DAX Formulas and Power BI Desktop

Pre-requisites

Basic knowledge of Database Management Systems and MS Excel

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the basics concepts of Power BI	Understand
CO2	Understand the Microsoft Data Analytics	Understand
CO3	Apply Model Data with Power BI	Apply
CO4	Build And Modify Semantic Model in Power BI	Apply
CO5	Understand the DAX Formulas and Power BI Desktop	Understand

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO2	3	2	3	2	-	-	-	-	2	2	2	2	3	3	-
CO3	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO4	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
CO5	3	2	3	3	-	-	-	-	2	2	2	2	3	3	-
3 - Strong; 2 - Medium; 1 - Some															

(Internal Assessment: 50 Marks + End Semester examination: 50 Marks)

Assessment 1 (Presentation)		Assessment 2 (CA Test)	Assessment 3 (Model – Presentation)	
Assessment Parameters	**Marks**	**Marks**	**Assessment Parameters**	**Marks**
Problem Identification	10	Questions from CO1 to CO4 As per CA Test Pattern	Innovation	30
Innovation	30		Clarity in Presentation	10
Solution for problem	10		Demo	30
Clarity in Presentation	05		Completion of Report	20
Viva	05		Viva	10
Total	**60**	**60**	**Total**	**100**

Note:

1. For Assessment 2 (CA Test) questions from CO1 to CO4 as per the CA Test question pattern has to be followed.
2. Students should submit the project report and present their project work with necessary demonstration.
3. During End Semester Examination the student project work will be evaluated based on the above-mentioned parameters.

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Syllabus

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60 IT L03 - Power BI								
IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
IV	1	0	4	75	3	50	50	100

Introduction Data - Data Analysis - Microsoft Excel - Power BI - Business Intelligence (BI) - Power BI Desktop (Power Query, Power Pivot, Power View) - Power BI Service - Power BI Mobile Flow.	[3]
Microsoft Data Analytics Discover Data Analysis - Overview of Data Analysis - Roles in Data - Tasks of a Data Analyst - Building with Power BI - Use Power BI - Building Blocks of Power BI - Tour and Use the Power BI Service.	[3]
Model Data Power BI Desktop Models - Star Schema Design - Analytic Queries - Configure Report Visuals - Power BI Model Framework - Power BI Model Fundamentals - Develop an Import Model - Develop a Direct Query Model - Develop a Composite Model - Model Framework.	[3]
Semantic Model Work with Tables - Create a Date Table - Work with Dimensions - Data Granularity - Work with Relationships and Cardinality - Model Data in Power BI Desktop.	[3]
DAX Formulas and Power BI Desktop DAX Formulas - DAX Data Types - DAX Functions - DAX Operators - DAX Variables - Power BI Desktop: Create Simple Measures - Create Compound Measures - Create Quick Measures Calculated Columns with Measures	[3]
Total Hours :15 (Theory) + 60 (Practical)	**75**

Text Book(s):	
1.	Chandraish Sinha ,"Mastering Power BI (Author), 30 September 2021
2.	Alberto Ferrari Marco Russo "The Definitive Guide to DAX : Business intelligence for Microsoft Power BI, SQL Server Analysis Services, and Excel, 2e , 15 September 2020
Reference(s):	
1.	Errin O'Connor ,"Microsoft Power Bi Dashboards Step by Step", 6 March 2020
2.	Carty Binn "Excel & Power BI Guide : The Concise Step-by-Step Practical Guide to Master Everything About "
	"Microsoft Excel & Power BI for Data Modelling, Analysis, Visualization & Transformation" ,Kindle Edition,17 March 2022
3.	Derek Wilson "Learn Power BI : Step by Step Guide to Building Your Own Reports", Kindle Edition ,7 March 2022

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Introduction**	
1.1	Data - Data Analysis	1
1.2	Microsoft Excel	1
1.3	Microsoft Excel	1
1.4	Power BI	1
1.5	Business Intelligence (BI)	1
1.6	Power BI Desktop (Power Query, Power Pivot, Power View)	1
1.7	Power BI Desktop (Power Query, Power Pivot, Power View)	1
1.8	Power BI Service	1
1.9	Power BI Mobile Flow	1
2	**Microsoft Data Analytics**	
2.1	Discover Data Analysis	1
2.2	Overview of Data Analysis	1
2.3	Roles in Data	1
2.4	Tasks of a Data Analyst	1
2.5	Building with Power BI	1
2.6	Use Power BI	1
2.7	Building Blocks of Power BI	1
2.8	Tour and Use the Power BI Service	1
2.9	Tour and Use the Power BI Service	1
3	Model Data	
3.1	Power BI Desktop Models	1
3.2	Star Schema Design	1
3.3	Analytic Queries - Configure Report Visuals	1
3.4	Power BI Model Framework	1
3.5	Power BI Model Fundamentals	1
3.6	Develop an Import Model	1
3.7	Develop a Direct Query Model	1
3.8	Develop a Composite Model	1
3.9	Model Framework	1
4	Semantic Model	
4.1	Work with Tables	1
4.2	Create a Date Table	1
4.3	Work with Dimensions	1
4.4	Data Granularity	1
4.5	Work with Relationships and Cardinality	1
4.6	Work with Relationships and Cardinality	1
4.7	Model Data in Power BI Desktop. DEMO Lab Experiment	1
4.8	Model Data in Power BI Desktop	1
4.9	Model Data in Power BI Desktop	1
5	**DAX Formulas and Power BI Desktop**	
5.1	DAX Formulas	1
5.2	DAX Data Types	1

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5.3	DAX Functions	1
5.4	DAX Operators - DAX Variables	1
5.5	Power BI I Desktop: Create Simple Measures	1
5.6	Create Compound Measures	1
5.7	Create Compound Measures	1
5.8	Create Quick Measures Calculated Columns	1
5.9	Create Quick Measures Calculated Columns	1

Course Designer(s)

1. Mr.S.Arulmurugan – arulmurugan@ksrct.ac.in

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60 IT E12/ 60 IT L04	C# and .Net Framework	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To learn basic programming in C#
- To know the object oriented aspects of C#
- To be aware of application development in .NET
- To update and enhance the skills in writing Windows applications and ADO.NET
- To learn web based applications on .NET

Pre-requisites

Basic knowledge of any programming language

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Analyse the basic structure of a C# application	Analyse
CO2	Develop C# programs which makes use of inheritance, polymorphism, interfaces and handle exceptions	Analyse
CO3	Design windows application and access data with ADO.NET	Analyse
CO4	Apply the knowledge of data binding to create Web forms and obtain knowledge of Web Services	Analyse
CO5	Discuss about assemblies, versioning and explore the activities of marshalling and Remoting	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	2	2	-	-	3	3	2
CO2	3	3	3	3	3	-	-	-	2	2	-	-	3	3	2
CO3	3	3	3	2	2	-	-	-	2	3	3	-	3	3	2
CO4	3	3	3	2	2	-	-	-	2	3	3	-	3	3	2
CO5	3	3	3	2	2	-	-	-	2	3	3	-	3	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	6	6	16
Understand	4	4	24
Apply	30	30	40
Analyse	20	20	20
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 IT E12/ 60 IT L04– C# and .Net Framework								
IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to C#* Introducing to C#, Overview of C#, Literals, Variables and Data Types, Operators and Expressions, Branching and Looping, Methods, Arrays, Strings, Structures and Enumerations, Boxing and Unboxing.	[9]
Object Oriented Aspects of C#* Class, Objects, Constructors and its Types, Inheritance, Properties, Indexers, Index Overloading, polymorphism, Sealed Class and Methods, Interface, Abstract Class, Operator Overloading, Delegates, Events, Errors and Exception, Threading.	[9]
Window Based Application Development on .NET* Understanding .NET - Building Windows Applications - Creating a Simple Windows Forms, Creating a Windows Forms Application, XML Documentation Comments. Accessing Data with ADO.NET, Relational Databases and SQL, ADO .NET Object Model, Using OLE DB Managed Providers and Working with Data-Bound Controls.	[9]
Web Based Application Development on .NET* Understanding Web Forms - Creating a Web Forms - Adding Controls - Data Binding, Web Services - SOAP, WSDL and Discovery - Building a Web Service - Passing Datasets, Returning Datasets from Web Services, Creating the Proxy - Session and Cache management.	[9]
The CLR and The .NET Framework* Assemblies, Versioning, Attributes, Reflection, Viewing Meta Data, Type discovery, Reflection on Type, Marshalling, Remoting, Security in .NET.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Balagurusamy E., “Programming in C#”, 4th Edition, Tata McGraw-Hill, 2017.
2.	Ian Griffiths, Matthew Adams, Jesse Liberty, “Programming C# 4.0”, Sixth Edition, O‟Reilly, 2010.
Reference(s):	
1.	Herbert Schildtz, “The Complete Reference: C# 4.0”, Tata McGraw Hill, 2012.
2.	Christian Nagel et al. “Professional C# 2012 with .NET 4.5”, Wiley India, 2012.
3.	Andrew Troelsen , “Pro C# 2010 and the .NET 4 Platform”, Fifth edition, A Press, 2010
4.	Robinson et al, “Professional C#”, 3rd Edition, Wrox Press, 2004.

*SDG 9 – Industry Innovation and Infrastructure

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to C#**	
1.1	Introducing C#	1
1.2	Overview of C# - Literals, Variables and Data Types	1
1.3	Operators and Expressions	1
1.4	Branching and Looping	1
1.5	Methods	1
1.6	Strings	1
1.7	Structures and Enumerations	2
1.8	Boxing and Unboxing	1
2.0	**Object Oriented Aspects of C#**	
2.1	Class, Objects	1
2.2	Constructors And Its Types	1
2.3	Inheritance, Properties	1
2.4	Indexers, Index Overloading	1
2.5	Polymorphism, Sealed Class And Methods	1
2.6	Operator Overloading, Delegates, Events	2
2.7	Errors And Exception	1
2.8	Threading	1
3.0	**Window Based Application Development on .NET**	
3.1	Understanding .NET - Building Windows Applications	1
3.2	Creating a Simple Windows Forms	1
3.3	Creating a Windows Forms Application	1
3.4	XML Documentation Comments	1
3.5	Accessing Data with ADO.NET	1
3.6	Relational Databases and SQL	1
3.7	ADO .NET Object Model	1
3.8	Using OLE DB Managed Providers and Working with Data	1
3.9	Bound Controls	1
4.0	**Web Based Application Development on .Net**	
4.1	Understanding Web Forms - Creating a Web Forms	1
4.2	Adding Controls	1
4.3	Data Binding	1
4.4	Web Services - SOAP	1
4.5	WSDL and Discovery - Building a Web Service	1
4.6	Passing Datasets- Returning Datasets From Web Services	1
4.7	Creating the Proxy	1
4.8	Session and Cache management	2
5.0	**The CLR and The .NET Framework**	
5.1	Assemblies, Versioning	1
5.2	Attributes, Reflection	1
5.3	Viewing Meta Data	1
5.4	Type Discovery	1
5.5	Reflection on Type	1
5.6	Marshalling	1
5.7	Remoting	1
5.8	Security in .NET	2

Course Designer(s)

1. Dr.C. Nallusamy - nallusamyc@ksrct.ac.in

Rev. No.1/w.e.f. 19/07/2025
Approved Passed in BoS Meeting held on 18/06/2025
in Academic Council Meeting held on 19/07/2025

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60 IT L05	Web Design	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To enhance the knowledge of how to develop a web page using Html
- To classify the various styles and dimensions of CSS
- To design webpage using JavaScripts
- To implement strategies involved in DOM using various events
- To implement the various approach of database connectivity

Pre-requisites

- Java Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Identify different types of HTML tags, their functionality and attributes and learn the basics of web services	Remember
CO2	Classify CSS to control the appearance of web pages and denote the background elements and media types	Understand
CO3	Incorporate JavaScript variables, operators and functions in web pages and manipulate HTML forms to validate user inputs	Understand
CO4	Demonstrate various JavaScript object models and create a web page with dynamic style using JavaScript and DOM	Analyse
CO5	Demonstrate the database connectivity and simple PHP application program using web server	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	2	-	-	-	-	-	-	3	-	-
CO2	3	2	3	-	-	-	2	-	3	-	-	-	-	3	-
CO3	3	2	2	-	-	-	-	-	-	2		2	-	-	3
CO4	3	2	2	2	-	-	-	2	-	-	1	-	-	-	-
CO5	3	2	2	-	2	2	-	-	-	-		-	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	10
Understand	40	20	20
Apply	-	20	60
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 IT L05 – Web Design								
IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction Introduction to HTML – Benefits of HTML – Structure of an HTML Document, HTML Tags: Attributes – meta Elements – Linking – Lists- Tables- Forms- Form Elements- Form Attributes – Web services.	[9]
Cascading Style Sheets* Introduction to CSS - Inline Styles – Conflicting Styles- Style Sheets- Positioning Elements – Backgrounds –Dimensions- Text Flow- Media Types – Drop-Down Menu.	[9]
Scripting Language* Introduction to Scripting Language – Data Types - Variables – Expressions – Operators and Control Statements – Arrays – User Defined Functions – Events	[9]
JavaScript Objects JavaScript Objects: String – Math – Date – Boolean and Number – Window – Document – Document Object Model (DOM) – DOM Collections – Dynamic Styles.	[9]
Implementation Strategies Introduction to PHP: Basics – String Processing and Regular Expressions – Form Processing and Business Logic – Connecting to a Database – Using Cookies – Dynamic Content – Operator Precedence Chart – Database Connectivity: SQL: DDL – DML- MySQL: Creating Database in MySQL – Mini Project	[9]
Total Hours:	**45**

Text Book(s):	
1.	Harvey Deitel, Abbey Deitel, “Internet and World Wide Web How to Program”, 8th Edition, (Harvey & Paul) Deitel & Associates, 2021.
2.	Harvey Deitel, “Web Technologies- HTML, JavaScript, PHP, Java, JSP, XML and AJAX”, Black Book, KoGent Learning Solutions Inc., Dreamtech Press, 2014.
Reference(s):	
1.	Robert. W. Sebesta, "Programming the World Wide Web", 8thEdition, Pearson Education, 2015.
2.	Jeffrey C.Jackson, "Web Technologies-A Computer Science Perspective", Pearson Education, 2007.
3.	http://www.w3schools.com/
4.	Paul Deitel, Harvey Deitel and Abbey Deitel,” Internet and World Wide Web How to Program”, 5th Edition, Pearson Education, 2018.

*SDG 4 – Quality in Education

Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Introduction to HTML – Benefits of HTML	1
1.2	Structure of an HTML Document	1
1.3	HTML Tags : Attributes	1
1.4	Meta Elements	1
1.5	Linking	1
1.6	Lists	1
1.7	Tables-Forms	2
1.8	Form Elements- Form Attributes – Web services	1
2.0	**Cascading Style Sheets**	
2.1	Introduction to CSS	1

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2.2	Inline Styles	1
2.3	Conflicting Styles	1
2.4	Style Sheets	1
2.5	Positioning Elements	1
2.6	Backgrounds	1
2.7	Dimensions	1
2.8	Text Flow- Media Types	1
2.9	Drop-Down Menu	1
3.0	**Scripting Language**	
3.1	Introduction to Scripting Language	1
3.2	Datatypes	1
3.3	Variables	1
3.4	Expressions	1
3.5	Operators and Control Statements	1
3.6	Arrays	1
3.7	User Defined Functions	2
3.8	Events	1
4.0	**JavaScript Objects**	
4.1	JavaScript Objects: String	1
4.2	Math	1
4.3	Date	1
4.4	Boolean and Number	1
4.5	Window	1
4.6	Document	1
4.7	Document Object Model (DOM)	1
4.8	DOM Collections	2
4.9	Dynamic Styles	1
5.0	**Implementation Strategies**	
5.1	Introduction to PHP: Basics	1
5.2	String Processing and Regular Expressions	1
5.3	Form Processing and Business Logic	1
5.4	Connecting to a Database	1
5.5	Using Cookies	1
5.6	Dynamic Content	1
5.7	Operator Precedence Chart - Database Connectivity: SQL: DDL – DML	2
5.8	MySQL: Creating Database in MySQL – Mini Project	1

Course Designer(s)

1. Mr.M.Thilakraj - mthilakraj@ksrct.ac.in

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60 IT L06	Data Analytics using R Programming	Category	L	T	P	Credit
		OE	3	0	0	3

Objectives

- To learn about Data analytics and its application areas.
- To understand the use of R-software and its fundamental concepts for data analytics.
- To be able to understand R Programming Decision making, functions, control statements and data structures.
- To be able to understand data visualization using R programming.
- To learn statistical methods and models for data analytics.

Pre-requisites

- Basic knowledge of programming concepts

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Define the concept of data analytics, its types, and its applications in real-world scenarios	Remember
CO2	Illustrate the fundamental concepts of R programming, such as loops, decision-making, and data structures.	Understand
CO3	Incorporate R programming to implement basic functions, loops, and conditional statements for problem-solving.	Apply
CO4	Analyze datasets by applying R programming techniques to visualize data using graphs and charts.	Analyse
CO5	Analyze the role of statistical computations in solving data analytics problems, identifying how statistical methods can reveal patterns, trends, and relationships within datasets.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	3	2	3	2	-	-	2	-	-	-	2	2	2
CO2	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
CO3	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
CO4	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
CO5	2	3	3	2	3	2	-	-	2	-	-	-	2	3	2
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	30	10	10
Understand	30	20	20
Apply	-	20	60
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
60 IT L06 – Data Analytics using R Programming								
IT								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to Data Analysis: Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.	[9]
Introduction to R Programming: Overview of R programming, Features of R, Applications of R, Introduction and Installation of R Studio, Creation and Execution of R File in R Studio, Clear the Console and the Environment in R Studio, Basic Syntax in R Programming, R Commands, Variables and scope of variables, Data Types, Operators, and Keywords.	[9]
R Programming Basics: How to take Input from user in R, Output in R using different functions, Decision making statements, Looping statements, Break next, return statements, Switch case, Data Structure in R: Vectors , Lists , Data frames , Matrices, Arrays.	[9]
Data Visualization using R : Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Bar Charts, Line Graphs, Scatterplots, Pie Charts, Boxplots, Histograms	[9]
Statistics with R: Mean, Median and Mode, Variance and Standard Deviation, Descriptive Analysis, Normal Distribution, Binomial Distribution, Analysis of Variance (ANOVA) Test : One Way & Two Way ANOVA, Regression: Linear and Multiple Linear Regression, Logistic Regression. Time Series Analysis, Survival Analysis.	[9]
Total Hours:	**45**

Text Book(s):	
1.	"R for Everyone", Jared P Lander, Pearson Education 2018, Second Edition.
2.	"Beginning R: An Introduction to Statistical Programming"-Larry Pace, Latest Edition.
3.	"Big Data Fundamentals" Thomas Erl, Wajid Khattak,and Paul Buhler:: Concepts, Dribers and techniques, Pearson, Latest Edition.
Reference(s):	
1.	"Introductory Statistics with R", P Dalgaard, Second edition
2.	"Beginning R-The statistical Programming language", Mark Gardner, John wiley & sons 2012, Latest Edition.
3.	"An Introduction to R" , Notes on R: A Programming Environment for Data Analysis and Graphics.
4.	URL : https://cran.rproject.org/doc/manuals/r-release/R-intro.pdf

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60 IT L07	Medical Robotics	Category	L	T	P	Credit
		PC	1	0	4	3

Objectives

- To introduce the fundamentals of medical robotics, including surgical, rehabilitation and assistive robotic systems used in healthcare.
- To understand the principles of computer-integrated surgery, medical imaging and image-guided robotic interventions.
- To apply robot kinematics, control and teleoperation techniques for safe and precise medical robot operation.
- To analyze robot-assisted surgery, rehabilitation robotics and prosthetic systems in real clinical scenarios.
- To develop industry-relevant skills for designing, simulating and validating AI-enabled medical robotic systems.

Pre-requisites

- Basic knowledge of Programming (Python or C/C++)
- Fundamental understanding of Artificial Intelligence and Robotics
- Basic concepts of Linear Algebra and Signals

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the fundamentals of medical robotics, computer-integrated surgery and robotic system architectures.	Understand
CO2	Apply medical imaging, sensing and image-guided navigation techniques in robotic surgical and rehabilitation systems.	Apply
CO3	Apply robot kinematics, control and teleoperation strategies for safe and precise medical robot operation.	Apply
CO4	Analyze robot-assisted surgery, rehabilitation robotics and prosthetic systems in clinical and healthcare applications.	Analyse
CO5	Evaluate AI-enabled medical robotic systems, clinical performance and emerging trends in healthcare robotics.	Evaluate

Mapping with Programme Outcomes

COs	Pos											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	3	2	1	-	1	-	-	-	-	-	-	2	1	-
CO2	3	3	2	2	2	-	-	-	-	-	-	3	2	-
CO3	3	3	2	2	2	-	-	-	-	-	-	3	2	-
CO4	2	3	2	3	2	1	-	-	-	-	-	3	2	-
CO5	2	2	2	3	3	1	-	1	1	2	2	3	3	-
3 - Strong; 2 - Medium; 1 – Some														

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		Model Examination (Marks)	End Sem Examination (Marks)
	1	2		
Remember	-	-	-	-
Understand	-	-	-	-
Apply	30	30	50	50
Analyse	30	30	50	50
Evaluate	-	-	-	-
Create	-	-	-	-
Total	60	60	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

60 IT L07 - Medical Robotics

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	1	0	4	75	3	50	50	100

UNIT I: Foundations of Medical Robotics and Surgical Systems* ** History and evolution of medical robotics – Classification of medical robots: surgical, rehabilitation, assistive and diagnostic robots – Fundamentals of computer-integrated surgery – Architecture of a medical robotic system: surgeon console, patient-side robot, imaging and control subsystems – Teleoperation and surgeon-in-the-loop control – Human–robot interaction in surgery – Safety, reliability and regulatory requirements in medical robotics – Basics of minimally invasive surgery and robotic integration – Role of haptic feedback and visual guidance in robotic surgery – Ethical and patient-centric considerations in medical robotic systems.	[3+12]
UNIT II: Medical Imaging, Sensing and Image-Guided Navigation Systems* ** Medical imaging modalities for robotics: X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and Ultrasound – Digital imaging and DICOM standards – Medical image acquisition, preprocessing and enhancement – Image segmentation and feature extraction for anatomical structures – Sensing technologies in medical robots: position, force, torque and tactile sensors – Optical, electromagnetic and inertial tracking systems – Registration of robot coordinates with patient anatomy – Image-guided navigation and real-time surgical tracking – Deformation and motion tracking of soft tissues – Integration of imaging, sensing and navigation in robot-assisted interventions.	[3+12]
UNIT III: Robotic Kinematics, Control and Teleoperation for Medical Applications* ** Kinematic structure of medical robots: serial, parallel and continuum manipulators – Forward and inverse kinematics of surgical robot arms – Velocity kinematics and Jacobian-based analysis – Singularities and workspace constraints in medical manipulators – Dynamic modeling of medical robots – Trajectory planning for safe and precise surgical motion – Control strategies for medical robots: position, force and impedance control – Teleoperation and shared control architectures – Haptic feedback and stability in teleoperated surgical systems – Simulation and validation of robotic motion for medical procedures.	[3+12]
UNIT IV: Robot-Assisted Surgery, Rehabilitation and Prosthetic Systems* * Robotically assisted minimally invasive surgery (MIS) – Laparoscopic and endoscopic robotic systems – Surgical navigation and calibration in robotic surgery – Applications of robotics in neurosurgery, orthopaedics, cardiac and urologic surgery – Radiosurgery and image-guided robotic interventions – Rehabilitation robotics: principles and clinical needs – Exoskeletons and wearable robotic devices – Prosthetic limb design and control – Brain–computer interface and assistive robots – Human biomechanics and its role in rehabilitation and prosthetic systems.	[3+12]
UNIT V: Intelligent Medical Robotics, Clinical Validation and Case Studies* ** Artificial intelligence in medical robotics – Machine learning and deep learning for surgical decision support – Visual servoing and learning-based robot control – Perceptual docking and skill learning in robotic surgery – Clinical validation and performance evaluation of medical robotic systems – Safety, risk analysis and regulatory standards for medical devices – Ethics and data privacy in healthcare robotics – Case studies of commercial medical robots: Da Vinci, ROSA, CyberKnife, and rehabilitation robots – Translational research, clinical trials and commercialization of medical robotic technologies.	[3+12]
Mini Projects: * ** ***	

1. Simulation of a Teleoperated Minimally Invasive Surgical Robot

Design and simulate a surgeon-controlled master–slave robotic system where a user operates a virtual laparoscopic robot using keyboard or joystick input, with camera-based visual feedback and safety constraints.

2. Image-Guided Robotic Navigation for Tumor or Organ Localization

Develop a system that uses medical images (CT/MRI/Ultrasound or camera images) to detect and track a target region (such as a tumor or organ) and guide the surgical robot toward the target using image-based navigation.

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3. Force-Controlled and Haptic-Enabled Surgical Robot Implement kinematics, trajectory planning and force/impedance control for a surgical robot, allowing safe tool motion with simulated haptic feedback to prevent excessive force on patient tissues. **4. Rehabilitation or Prosthetic Robotic System** Design and simulate a robotic rehabilitation device or prosthetic limb (e.g., robotic arm for physiotherapy, exoskeleton joint, or prosthetic hand) controlled using user inputs or biosignals for assisting patient movement. **5. AI-Enabled Intelligent Medical Robot with Clinical Validation** Integrate machine learning or deep learning for visual servoing, motion prediction or surgical assistance, and evaluate the performance, safety and reliability of the medical robotic system using clinical-style metrics and case studies. **Tools Used:** Python / ROS2 / Gazebo / PyBullet / OpenCV / NumPy / SciPy / PyTorch / TensorFlow / Keras / scikit-learn / Open3D / SimpleITK / Pydicom / RViz / Jupyter Notebook	
Total Hours:	75

Text Book(s):	
1.	Jacob Rosen, Blake Hannaford and Richard Satava (Eds.), Surgical Robotics: Systems, Applications, and Visions, Springer, 2011.
2.	Russell H. Taylor, Dan Stoianovici, Pierre E. Dupont and Gregory D. Hager, Medical Robotics and Computer-Integrated Surgery, IEEE Press, 2015.
3.	Mark W. Spong, Seth Hutchinson and M. Vidyasagar, Robot Modeling and Control, John Wiley & Sons, 2006.
4.	Roland Siegwart, Illah R. Nourbakhsh and Davide Scaramuzza, Introduction to Autonomous Mobile Robots, MIT Press, 2011.
5.	Gregory S. Fischer and Ron Alterovitz, Image-Guided Interventions: Technology and Applications, Springer, 2019.
Reference(s):	
1.	Jacob Rosen and Blake Hannaford, Springer Handbook of Robotics – Medical and Surgical Robotics Chapters, Springer, 2016.
2.	G. Niemeyer, C. Preusche, S. Stramigioli and D. Lee, Telerobotics, in Springer Handbook of Robotics, Springer, 2016.
3.	N. Enayati, E. De Momi and G. Ferrigno, Haptics in Robot-Assisted Surgery: Challenges and Benefits, IEEE Reviews in Biomedical Engineering, 2016.
4.	R. H. Taylor and D. Stoianovici, Medical Robotics in Computer-Integrated Surgery, IEEE Transactions on Robotics, 2003.
5.	Gabor Fichtinger, Peter Kazanzides and Allison M. Okamura, Surgical and Interventional Robotics, IEEE Robotics and Automation Magazine, 2008.

*SDG 3 – Health, surgery, rehabilitation, patient safety
**SDG 9 – Advanced medical technology and innovation
***SDG 10 – Assistive and rehabilitation robotics reducing disability-based inequality

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1	**Foundations of Medical Robotics and Surgical Systems**	
1.1	History and evolution of medical robotics	1
1.2	Classification of medical robots and surgical systems	1
2	**Medical Imaging, Sensing and Image-Guided Navigation**	
2.1	Medical imaging modalities and DICOM	1
2.2	Image preprocessing and segmentation	1
2.3	Image-guided navigation and tracking	1
3	**Robotic Kinematics, Control and Teleoperation**	
3.1	Kinematic modeling of medical robots	1
3.2	Trajectory planning and control	1
3.3	Multi-armed bandits and Monte Carlo methods	1
4	**Robot-Assisted Surgery and Rehabilitation Robotics**	
4.1	Robotically assisted minimally invasive surgery	1
4.2	Rehabilitation and prosthetic robotics	1
4.3	Assistive and wearable robotic systems	1
5	**Intelligent Medical Robotics and Clinical Validation**	
5.1	AI in medical robotics and visual servoing	1
5.2	Safety, ethics and regulatory standards	1
5.3	Case studies of medical robotic systems	1
Mini Projects:		
1	Teleoperated Minimally Invasive Surgical Robot (Unit-I)	12
2	Image-Guided Robotic Navigation System (Unit-II)	12
3	Force-Controlled and Haptic Surgical Robot (Unit-III)	12
4	Rehabilitation or Prosthetic Robotic System (Unit-IV)	12
5	AI-Enabled Intelligent Medical Robot with Validation (Unit-V)	12
	Total Hours:	**75**

Course Designer(s)

1. Mr. Insol Rajasekar S - insolrajasekar@ksrct.ac.in

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(Autonomous Institution)

Department of Information Technology

Revision introduced in R2022 Syllabi-2024 Admitted Batch

(Passed in 30th BoS meeting held on 06.05.2026 and approved in 30th Academic Council Meeting held on 13.06.2026)

2024 Admitted Batch

S. No.	Course Code	Name of the Course	Semester	Changes made
1.	61 IT 602	Full Stack Development	VI	Updated the syllabus to include JavaScript, React.js, Node.js, and Express.js.
2.	61 IT 003	Design Thinking	V	AI Automation Integrated into the Syllabus.
3.	60 IT E17	Cyber Forensics	V	Introduced as a new Honours Degree course.
4.	60 IT E18	Secure Software Engineering	V	Introduced as a Honour Degree course.
5.	60 IT E27	Cyber Laws, Privacy & Digital Ethics	VI	Introduced as a new Honours Degree course.
6.	60 IT E28	Cyber Threat Intelligence and Security Operations Center	VI	Introduced as a new Honours Degree course.
7.	60 IT E37	AI for Cybersecurity	VII	Introduced as a new Honours Degree course.
8.	60 IT E47	Cryptanalysis	VII	Introduced as a new Honours Degree course.
9.	60 IT E19	Data Warehousing and Mining	V	Introduced as a new Minor Degree course.
10.	60 IT E46	Business Intelligence	V	Introduced as a new Minor Degree course.
11.	60 IT E53	Social Network Analysis	VI	Introduced as a new Minor Degree course.
12.	60 IT E30	Data Privacy and Security	VI	Introduced as a new Minor Degree course.
13.	60 IT E38	Data Curation and Visualization	VII	Introduced as a new Minor Degree course.
14.	60 IT E48	Predictive Analytics	VII	Introduced as a new Minor Degree course.

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61 IT 602	Full Stack Development	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the fundamentals of MERN stack architecture and JavaScript programming.
- To develop interactive and responsive user interfaces using React JS.
- To build server-side applications and RESTful APIs using Node.js and Express.js.
- To design and manage NoSQL databases using MongoDB and Mongoose.
- To Integrate MERN stack components to develop, secure, and deploy full-stack web applications

Pre-requisites

- Basic knowledge of programming concepts and problem-solving.
- Familiarity with HTML, CSS, and JavaScript fundamentals.
- Basic understanding of database concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand modern web application architecture and JavaScript programming concepts.	Understand
CO2	Develop interactive and responsive user interfaces using React.	Apply
CO3	Build scalable server-side applications and REST APIs using Node.js and Express.js	Apply
CO4	Design and manage database systems using MongoDB and Mongoose.	Analyse
CO5	Develop, deploy and maintain complete MERN stack applications.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	2	1	1	1	1	1	-
CO2	3	3	3	3	2	1	-	-	2	-	2	3	2	2	1
CO3	3	3	2	2	2	2	-	-	2	2	2	3	2	2	1
CO4	3	3	2	2	2	1	-	-	1	1	2	2	2	2	1
CO5	3	3	3	3	3	1	-	-	-	-	2	2	2	2	1
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	6	10
Understand	10	4	10
Apply	40	40	70
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
61 IT 602– Full Stack Development								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Fundamentals of Web Development and JavaScript Introduction to Full Stack Development – Evolution of Web Technologies – Client-Server Architecture – Frontend, Backend and Database Concepts – Web Browsers and Web Servers – Introduction to MERN Stack – Setting up Development Environment –JavaScript Fundamentals – Variables, Data Types, Operators – Control Statements – Functions – Arrays and Objects – ES6 Features – Arrow Functions – Modules – Asynchronous Programming – Promises and Async/Await.	[9]
Frontend Development using React JS * Introduction to React JS – React Environment Setup – Components and Component Lifecycle – Functional Components – JSX – Props and State – Event Handling – Conditional Rendering – Lists and Keys – Forms and Form Validation – React Hooks (useState, useEffect, useContext) – React Router – Styling React Applications – Bootstrap and Material UI Integration – API Integration using Axios and Fetch API – State Management Concepts.	[9]
Backend Development using Node.js and Express.js Introduction to Node.js – Node Package Manager (NPM) – Modules and File System – Event Loop Architecture – Express.js Framework – Routing – Middleware – Request and Response Handling – RESTful API Design – CRUD Operations – Error Handling – Authentication and Authorization Concepts – JWT Authentication – Password Encryption using bcrypt – Environment Variables – API Testing using Postman.	[9]
MongoDB Database Management Introduction to NoSQL Databases – MongoDB Architecture – Installation and Configuration – Database and Collection Creation – CRUD Operations – Query Operators – Projection and Sorting – Aggregation Framework – Indexing – Schema Design – Validation – MongoDB Atlas – Mongoose ODM – Data Modeling – Connecting MongoDB with Express Applications.	[9]
MERN Stack Integration and Real-Time Applications ** Integration of React, Express, Node and MongoDB – Full Stack Application Architecture – Authentication and Authorization in MERN Applications – File Upload and Storage – Session Management – Deployment of MERN Applications – Case Study of MERN Applications – Mini Project Development and Deployment.	[9]
Total Hours:	**45**

Text Book(s):

1. Vasan Subramanian, Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress, 2019.
2. Shama Hoque, Full Stack React Projects: Learn MERN Stack Development by Building Modern Web Applications, 2nd Edition, Packt Publishing, 2023.

Reference(s):

1. Alex Banks and Eve Porcello, Learning React: Modern Patterns for Developing React Apps, 3rd Edition, O'Reilly Media, 2024.
2. Ethan Brown, Web Development with Node and Express: Leveraging JavaScript to Build Web Applications, 3rd Edition, O'Reilly Media, 2024.
3. Mern Stack Development Team, MERN Quick Start Guide: Build Web Applications with MongoDB, Express, React, and Node, Packt Publishing, Latest Edition.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Fundamentals of MERN Stack Development**	
1.1	Introduction to Full Stack Development and MERN Stack	1
1.2	Client-Server Architecture and Web Application Framework	1
1.3	Development Environment Setup (VS Code, Node.js, npm)	1
1.4	JavaScript Fundamentals (Variables, Data Types, Operators)	1
1.5	Functions, Arrays, Objects	1
1.6	ES6 Features	1
1.7	DOM Manipulation and Event Handling	1
1.8	Asynchronous JavaScript (Callbacks, Promises)	1
1.9	Async/Await and Introduction to Modern Web Applications	1
2.0	**React JS Frontend Development**	
2.1	Introduction to React JS and React Environment Setup	1
2.2	JSX and React Components	1
2.3	Props and State Management	1
2.4	Event Handling and Conditional Rendering	1
2.5	Forms and Form Validation	1
2.6	React Hooks (useState, useEffect)	1
2.7	React Router and Navigation	1
2.8	API Integration using Axios and Fetch API	1
2.9	Styling with Bootstrap/Material UI and Mini Application	1
3.0	**Node.js and Express.js Backend Development**	
3.1	Introduction to Node.js and npm	1
3.2	Node.js Modules and File System	1
3.3	Event Loop and Asynchronous Programming	1
3.4	Express.js Framework and Routing	1
3.5	Middleware and Request-Response Handling	1
3.6	REST API Development	1
3.7	CRUD Operations using Express.js	1
3.8	Authentication using JWT and bcrypt	1
3.9	API Testing using Postman	1
4.0	**MongoDB Database Management**	
4.1	Introduction to NoSQL and MongoDB	1
4.2	Database and Collection Creation	1
4.3	MongoDB CRUD Operations	1
4.4	Query Operators and Projection	1
4.5	Aggregation Framework	1
4.6	Indexing and Performance Optimization	1
4.7	Schema Design and Validation	1
4.8	MongoDB Atlas and Cloud Database	1
4.9	Mongoose ODM and Database Connectivity	1
5.0	**MERN Stack Integration and Deployment**	
5.1	MERN Architecture and Project Structure	1
5.2	Connecting React with Express APIs	2

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5.3	Connecting Express with MongoDB using Mongoose	2
5.4	Authentication and Authorization in MERN Applications	1
5.5	Deployment using Vercel, Render and MongoDB Atlas	2
5.6	Case Study on Real Time Applications (Java, MongoDB, React JS, Spring Boot with Microservices)	1

Course Designer(s)

1. Mr.D.Pradeep Kanna – pradeepkannad@ksrct.ac.in

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61 IT 003	Design Thinking	Category	L	T	P	Credit
		PC	2	0	2	3

Objectives

- To learn the five stages of the School of Design Thinking process (Feel, Define, Divergence, Convergence, and Storytelling).
- To understand the application of design thinking for AI problem framing in enterprise environments.
- To learn the enterprise AI ecosystem, including data infrastructure, machine learning pipelines, and cloud deployment.
- To identify and apply appropriate AI/ML approaches such as predictive, generative, and agentic AI for enterprise problems.
- To design responsible, ethical, and explainable AI systems aligned with governance frameworks.

Pre-requisites

- Basic knowledge of mathematics and programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Recall the principles and stages of the School of Design Thinking methodology and their relevance to enterprise AI applications.	Remember
CO2	Explain enterprise data strategies, machine learning concepts, and AI architectures used in organizational contexts.	Understand
CO3	Apply the Design Thinking process to identify and formulate AI problem statements for enterprise use cases.	Apply
CO4	Apply ethical, governance, and compliance principles, including fairness, explainability, and regulatory requirements, in enterprise AI solutions.	Apply
CO5	Apply enterprise AI techniques to prototype solutions, evaluate business impact, and communicate return on investment (ROI) to stakeholders.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	-	-	-	3	-	-	-	-	-	3	-	2	3
CO2	3	3	2	3	-	-	-	-	-	-	-	2	3	3	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	3	3	2
CO4	2	2	-	3	-	3	3	3	-	-	-	3	2	2	3
CO5	2	3	3	2	3	2	-	-	-	-	-	3	2	3	3

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)				Model Examination (Marks)	End Sem Examination (Marks)	
	Test 1		Test 2				
	Theory	Lab	Theory	Lab	Lab	Theory	Lab
Remember	40	-	-	-	-	30	-
Understand	20	-	30	-	-	50	-
Apply	-	50	30	50	50	10	50
Analyse	-	50	-	50	50	10	50
Evaluate	-	-	-	-	-	-	-
Create	-	-	-		-	-	-
Total	60	100	60	100	100	100	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

61 IT 003 – Design Thinking

Common to CSE, CSE(AIML), AI&DS , CSBS & IT

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	2	0	2	60	3	50	50	100

Foundations of Design Thinking* Introduction to Design Thinking and Human-Centred Innovation- The School of Design Thinking Framework- Human-Centred and Experience-Driven Problem Solving-Design Thinking for Enterprise AI Development -Design Thinking, Agile, and Lean Methodologies - Iterative Design Processes and Organisational Culture	[6]
Design Thinking for Enterprise AI Opportunity Identification and Validation** AI Readiness Assessment - Business Problem Identification and AI Problem Formulation- Enterprise Data Identification and Analysis – Success Metrics for AI Solutions - Stakeholder Mapping and Collaboration - Ethical and Responsible AI by Design	[6]
Enterprise AI Ecosystem and Data Strategy*** Enterprise AI Ecosystem and Open-Source Platforms- AI/ML System Architecture - Enterprise Data Strategy and Governance - Data Pipelines and Feature Engineering - Data Storage, MLOps, and LLMOps	[6]
AI/ML Architectures for Enterprise Use Cases*** Taxonomy of Enterprise AI Systems - Framework for Enterprise AI Solution Design - Time-Series Forecasting and Predictive Analytics Architectures - Classification, Recommendation, and NLP Architectures - Generative AI, RAG, and Agentic AI Systems - Multimodal AI, API Design, and Model Selection.	[6]
Responsible AI, Governance, Adoption, Integration and ROI Principles of Responsible and Ethical AI– AI Bias, Explainability, and Governance Frameworks – Privacy, Compliance, and Model Risk Management – Enterprise AI Adoption and Business Valu - AI Integration, Product Management, and Operations - Strategic Decisions and Future Trends in Enterprise AI.	[6]
Practical: 1. Students will select an enterprise persona (such as an HR officer, logistics coordinator, or finance executive) and conduct a structured empathy interview to understand the user's experiences, challenges, and needs. Based on their observations, they will develop an emotional journey map, formulate a Point of View (POV) statement, and generate "How Might We" (HMW) questions. Using brainstorming and prioritization techniques, students will identify the most promising solution and present a short story pitch demonstrating the complete Feel–Define–Diverge–Converge–Storytelling process.	**30**
2. Students will work in teams to select an enterprise domain such as Finance, Human Resources, Operations, or Customer Experience and prepare an AI Opportunity Canvas to identify business challenges, data requirements, stakeholders, and potential AI solutions. They will then conduct a stakeholder interview simulation, gather requirements from different perspectives, and refine the initial problem statement into a well-defined enterprise AI use case with measurable objectives and expected business impact.	
3. Students will explore and profile a sample enterprise dataset using Python, Pandas, and DuckDB in Google Colab to identify data quality issues, missing values, and potential feature candidates for AI applications. They will further implement semantic search by generating document embeddings using Sentence-Transformers and storing them in an open-source vector database such as ChromaDB or FAISS to perform similarity-based information retrieval for enterprise knowledge management scenarios.	
4. Students will develop and evaluate a time-series forecasting model using Prophet or LSTM on a publicly available financial or supply-chain dataset in Google Colab. They will also implement a basic Retrieval-Augmented Generation (RAG) pipeline by chunking and embedding enterprise documents using Sentence-Transformers, storing vectors in ChromaDB, and generating responses through an open-source large language model to support enterprise knowledge retrieval and question-answering applications.	

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5. Students will perform a bias audit on a sample HR or credit dataset using open-source fairness assessment tools to evaluate metrics such as demographic parity and equalized odds and propose mitigation strategies. They will also generate SHAP-based explanations for a trained classification model, interpret feature contributions, and present the results to a simulated non-technical stakeholder audience to demonstrate the principles of explainable and responsible AI in enterprise applications.	
6. Students will develop a comprehensive AI adoption plan for the enterprise use case identified in Module 2, including stakeholder mapping, key performance indicators (KPIs), governance considerations, risk assessment, and an implementation roadmap. As a capstone activity, teams will present and defend their end-to-end enterprise AI solution, covering problem identification, system architecture, model selection, ethical and governance aspects, deployment strategy, and expected business impact, followed by peer review and feedback.	
Total Hours:(Theory – 30 + Practical – 30)	60

Text Book(s):	
1.	Arun Jain, "Unmukt: Art and Science of Design Thinking", School of Design Thinking, 2021
2.	Mark Terwilliger, "AI in Business: Building Enterprise AI Architectures and Systems", independently published, 2023.
3.	Tim Brown, "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation", HarperBusiness, 2009.
Reference(s):	
1.	Kjell Carlsson et al., "AI Engineering: Building Applications with Foundation Models", O'Reilly Media, 2024.
2.	Omar Sanseviero, Pedro Cuenca et al., "Hands-On Generative AI with Transformers and Diffusion Models", O'Reilly Media, 2024.
3.	Valentina Alto, "Modern Generative AI with ChatGPT and OpenAI Models", Packt Publishing, 2023.
4.	Thimira Amaratunga, "Understanding Large Language Models", Apress, 2023.
5.	https://purplefabric-help.intellectai.com/
6.	https://dschool.stanford.edu

* SDG-4 – Quality Education

* * SDG-8 – Employment and decent work for all

* * * SDG-9 – Industrialization and foster innovation

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Foundations of Design Thinking**	
1.1	Introduction to Design Thinking and Human Centred Innovation	1
1.2	The School of Design Thinking Framework	1
1.3	Human-Centred and Experience Driven Problem Solving	1
1.4	Design Thinking for Enterprise AI Development	1
1.5	Design Thinking, Agile, and Lean Methodologies	1
1.6	Iterative Design Processes and Organisational Culture	1
2.0	**Design Thinking for Enterprise AI Opportunity Identification and Validation**	
2.1	AI Readiness Assessment	1
2.2	Business Problem Identification and AI Problem Formulation	1
2.3	Enterprise Data Identification and Analysis	1
2.4	Success Metrics for AI Solutions	1
2.5	Stakeholder Mapping and Collaboration	1
2.6	Ethical and Responsible AI by Design	1
3.0	**Enterprise AI Ecosystem and Data Strategy**	
3.1	Enterprise AI Ecosystem and Open-Source Platforms	1
3.2	AI/ML System Architecture	1
3.3	Enterprise Data Strategy and Governance s	1
3.4	Data Pipelines and Feature Engineering	1
3.5	Data Storage, MLOps, and LLMOps	2
4.0	**AI/ML Architectures for Enterprise Use Cases**	
4.1	Taxonomy of Enterprise AI Systems	1
4.2	Framework for Enterprise AI Solution Design	1
4.3	Time-Series Forecasting and Predictive Analytics Architectures	1
4.4	Classification, Recommendation, and NLP Architectures	1
4.5	Generative AI, RAG, and Agentic AI Systems	1
4.6	Multimodal AI, API Design, and Model Selection.	1
5.0	**Responsible AI, Governance, Adoption, Integration and ROI**	
5.1	Principles of Responsible and Ethical AI–	1
5.2	AI Bias, Explainability, and Governance Frameworks	1
5.3	Privacy, Compliance, and Model Risk Management	1
5.4	Enterprise AI Adoption and Business Value	1
5.5	AI Integration, Product Management, and Operations	1
5.6	Strategic Decisions and Future Trends in Enterprise AI.	1
Practical:		
1	Students will select an enterprise persona (such as an HR officer, logistics coordinator, or finance executive) and conduct a structured empathy interview to understand the user's experiences, challenges, and needs. Based on their observations, they will develop an emotional journey map, formulate a Point of View (POV) statement, and generate "How Might We" (HMW) questions. Using brainstorming and prioritization techniques, students will identify the most promising solution and present a short story pitch demonstrating the complete Feel–Define–Diverge–Converge–Storytelling process.	5
2	Students will work in teams to select an enterprise domain such as Finance, Human Resources, Operations, or Customer Experience and prepare an AI Opportunity Canvas to identify business challenges, data requirements, stakeholders, and potential AI solutions. They will then conduct a stakeholder	5

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	interview simulation, gather requirements from different perspectives, and refine the initial problem statement into a well-defined enterprise AI use case with measurable objectives and expected business impact.	
3	Students will explore and profile a sample enterprise dataset using Python, Pandas, and DuckDB in Google Colab to identify data quality issues, missing values, and potential feature candidates for AI applications. They will further implement semantic search by generating document embeddings using Sentence-Transformers and storing them in an open-source vector database such as ChromaDB or FAISS to perform similarity-based information retrieval for enterprise knowledge management scenarios.	5
4	Students will develop and evaluate a time-series forecasting model using Prophet or LSTM on a publicly available financial or supply-chain dataset in Google Colab. They will also implement a basic Retrieval-Augmented Generation (RAG) pipeline by chunking and embedding enterprise documents using Sentence-Transformers, storing vectors in ChromaDB, and generating responses through an open-source large language model to support enterprise knowledge retrieval and question-answering applications.	5
5	Students will perform a bias audit on a sample HR or credit dataset using open-source fairness assessment tools to evaluate metrics such as demographic parity and equalized odds and propose mitigation strategies. They will also generate SHAP-based explanations for a trained classification model, interpret feature contributions, and present the results to a simulated non-technical stakeholder audience to demonstrate the principles of explainable and responsible AI in enterprise applications.	5
6	Students will develop a comprehensive AI adoption plan for the enterprise use case identified in Module 2, including stakeholder mapping, key performance indicators (KPIs), governance considerations, risk assessment, and an implementation roadmap. As a capstone activity, teams will present and defend their end-to-end enterprise AI solution, covering problem identification, system architecture, model selection, ethical and governance aspects, deployment strategy, and expected business impact, followed by peer review and feedback.	5
	Total	60

Course Designer(s)
Dr.P.Dineshkumar
Ms.S.Pavithra

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60 IT E17	Cyber Forensics	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To Understand the fundamental concepts of cyber forensics, cybercrime, digital evidence, cyber laws, and ethical issues related to digital investigations.
- To Develop the knowledge and skills required to perform computer, network, and memory forensic investigations using standard forensic methodologies and tools.
- To Analyze forensic evidence from mobile devices, cloud platforms, IoT devices, and social media applications while understanding their unique challenges.
- To Apply malware analysis techniques, incident response procedures, and threat intelligence concepts to investigate and mitigate cyber security incidents..
- To Explore emerging trends in cyber forensics, including AI-assisted investigations, blockchain and cryptocurrency forensics, OSINT, anti-forensics, and digital evidence reporting.

Pre-requisites

- Basic knowledge of Computer Networks and Internet concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the principles of cyber forensics, cybercrime investigation, digital evidence handling, chain of custody, and relevant cyber laws.	Remember
CO2	Perform forensic investigations on computer systems, operating systems, memory, networks, emails, and web browsers using established forensic techniques.	Understand
CO3	Investigate and analyze evidence from mobile devices, cloud environments, IoT devices, and social media applications using appropriate forensic methodologies.	Apply
CO4	Analyze malware behavior, identify indicators of compromise (IoCs), and apply incident response and threat intelligence techniques to cyber security incidents.	Analyse
CO5	Evaluate modern cyber forensic techniques involving AI, blockchain, cryptocurrency investigations, OSINT, anti-forensics, and prepare professional digital forensic investigation reports.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	10
Understand	40	10	20
Apply	-	20	40
Analyse	-	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022

B.Tech – Information Technology

60 IT E17– Cyber Forensics

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Foundations of Cyber Forensics* Introduction to Cyber Forensics and Cybercrime - Information Systems and Digital Evidence - Types of Cybercrimes and Cybercriminal Profiles - Cybercrime Investigation Process - Digital Evidence: Identification, Collection, Preservation and Chain of Custody-Cyber Laws and Ethics - Indian IT Act 2000 & 2008 Amendments - Privacy, Data Protection and Electronic Evidence	[9]
Computer and Network Forensics* Digital Forensic Investigation Process -Disk and File System Forensics -Windows and Linux Forensics - Memory (RAM) Forensics -Log Analysis and Timeline Reconstruction -Network Forensics - Packet Capture and Traffic Analysis -Email and Browser Forensics	[9]
Mobile and Cloud Forensics * Mobile Device Architecture -Android and iOS Forensics -SIM Card and SD Card Analysis - Mobile Application Forensics -WhatsApp, Telegram and Social Media Forensics - Cloud Computing Challenges - Cloud Forensics -IoT and Smart Device Forensics	[9]
Malware Analysis and Incident Response** Malware Types and Characteristics - Viruses, Worms, Trojans, Ransomware -Rootkits and Botnets - Static and Dynamic Malware Analysis - Reverse Engineering Basics - Indicators of Compromise (IoCs) - Incident Response Life Cycle - Threat Intelligence and Threat Hunting - Introduction to SIEM and SOC Operations	[9]
Emerging Trends in Cyber Forensics ** AI in Digital Forensics -Machine Learning for Cybercrime Detection-Cryptocurrency and Blockchain Forensics - Dark Web Investigation -OSINT (Open Source Intelligence)- Anti-Forensics Techniques -Digital Evidence Reporting - Case Studies on Recent Cybercrime Investigations -Challenges and Future Trends in Cyber Forensics	[9]
Total Hours:	**45**

Text Book(s):

1. Bill Nelson, Amelia Phillips, Christopher Steuart, **"Guide to Computer Forensics and Investigations"**, 7th Edition, Cengage Learning, 2022.
2. Eoghan Casey, **"Digital Evidence and Computer Crime: Forensic Science, Computers and the Internet"**, 4th Edition, Academic Press (Elsevier), 2020.

Reference(s):

1. Adv. Prashant Mali "Cyber Law & Cyber Crimes Simplified", 6th Edition, Kindle Edition, 2021.
2. Pankaj Agarwal, "Information Security & Cyber Laws (Acme Learning)", Excel, 2020.
3. Nina Godbole, SunitBelapure "Cyber security Understanding Cyber Crimes, Computer Forensics and Legalperspectives", Wiley publication, 2020.
4. Satish Bommisetty, Heather Mahalik, and Rohit Tamma, **"Practical Mobile Forensics"**, 4th Edition, Packt Publishing, 2021.

* SDG-4 – Quality Education

** SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Foundations of Cyber Forensics**	
1.1	Introduction to Cyber Forensics and Cybercrime	1
1.3	Information Systems and Digital Evidence	1
1.4	Types of Cybercrimes and Cybercriminal Profiles	1
1.5	Cybercrime Investigation Process	1
1.6	Digital Evidence: Identification, Collection, Preservation and Chain of Custody	2
1.7	Cyber Laws and Ethics	1
1.8	Indian IT Act 2000 & 2008 Amendments	1
1.9	Privacy, Data Protection and Electronic Evidence	1
2.0	**Computer and Network Forensics**	
2.1	Digital Forensic Investigation Process	1
2.2	Disk and File System Forensics -Windows and Linux Forensics	2
2.4	Memory (RAM) Forensics	2
2.6	Log Analysis and Timeline Reconstruction	2
2.8	Network Forensics	1
2.9	Packet Capture and Traffic Analysis -Email and Browser Forensics	1
3.0	**Mobile and Cloud Forensics**	
3.1	Mobile Device Architecture	1
3.2	Android and iOS Forensics-Android and iOS Forensics	1
3.3	SIM Card and SD Card Analysis	1
3.4	Mobile Application Forensics	1
3.5	WhatsApp, Telegram and Social Media Forensics	2
3.7	Cloud Computing Challenges	1
3.8	Cloud Forensics	1
3.9	IoT and Smart Device Forensics	1
4.0	**Malware Analysis and Incident Response**	
4.1	Malware Types and Characteristics	1
4.2	Viruses, Worms, Trojans, Ransomware	1
4.3	Rootkits and Botnets	1
4.4	Static and Dynamic Malware Analysis	1
4.5	Reverse Engineering Basics	1
4.6	Indicators of Compromise (IoCs) - Incident Response Life Cycle	1
4.7	Threat Intelligence and Threat Hunting	2
4.9	Introduction to SIEM and SOC Operations	1
5.0	**Emerging Trends in Cyber Forensics**	
5.1	AI in Digital Forensics	1
5.2	Machine Learning for Cybercrime Detection	1
5.3	Cryptocurrency and Blockchain Forensics	1
5.4	Dark Web Investigation	1
5.5	OSINT (Open Source Intelligence)	1
5.6	Anti-Forensics Techniques	1
5.7	Digital Evidence Reporting	1
5.8	Case Studies on Recent Cybercrime Investigations	1
5.9	Challenges and Future Trends in Cyber Forensics	1
	Total Hours	**45**

Course Designer(s)

1. Dr.K.Mahalakshmi - mahalakshmik@ksrct.ac.in

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60 IT E18	Secure Software Engineering	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the fundamental concepts, principles, and challenges of secure software development and software assurance.
- To apply secure requirements engineering techniques, threat modeling, and risk assessment during software development.
- To design and develop secure software architectures by adopting secure coding practices and mitigating common software vulnerabilities.
- To analyze software security using security testing techniques, vulnerability assessment, and penetration testing methodologies.
- To develop secure software deployment and maintenance strategies by integrating DevSecOps practices and software security governance.

Pre-requisites

- Basic knowledge of programming concepts and software development.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the principles of secure software development, software assurance, security models, and common software vulnerabilities.	Understand
CO2	Apply secure requirements engineering techniques, threat modeling, and risk assessment methods to identify software security requirements.	Apply
CO3	Apply secure software design principles and secure coding practices to develop software resistant to common security attacks.	Apply
CO4	Apply software security using static and dynamic testing techniques, vulnerability assessment, penetration testing, and OWASP security standards.	Apply
CO5	Develop secure software deployment, maintenance, and governance strategies by applying DevSecOps practices and enterprise software security frameworks.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	3	-	-	-	-	-	3	3	2	3	3	2	-
CO2	3	-	3	-	-	-	-	-	3	3	2	3	3	2	-
CO3	3	-	3	-	-	-	-	-	3	3	2	3	3	2	-
CO4	3	-	3	-	-	-	-	-	3	3	2	3	3	2	-
CO5	3	-	3	-	-	-	-	-	3	3	2	3	3	2	-

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	20	10	20
Apply	30	20	30
Analyse	-	20	30
Evaluate	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech. Information Technology								
60 IT E18-Secure Software Engineering								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Introduction to Secure Software: Introduction, Software Security vs Software Assurance, Need for Secure Software, Common Software Threats, Sources of Software Vulnerabilities, CIA Triad, Security Principles (Least Privilege, Defense in Depth), Properties of Secure Software.	[9]
Requirements Engineering for Secure Software: Introduction, Security Requirements, SQUARE Process Model, Requirements Elicitation and Prioritization, Threat Modeling Basics, STRIDE Model, Risk Assessment.	[9]
Secure Software Architecture and Secure Coding: Secure Design Principles, Architectural Risk Analysis, Security Design Guidelines, Attack Patterns, Secure Coding Practices, Input Validation, Authentication & Authorization, Common Vulnerabilities (SQL Injection, XSS, CSRF), Secure Code Review, Static Code Analysis.	[9]
Software Security Testing: Security Testing Fundamentals, Static Application Security Testing (SAST), Dynamic Application Security Testing (DAST), Vulnerability Assessment, Penetration Testing Basics, OWASP Top 10, Security Testing throughout the SSDLC.	[9]
Secure Software Deployment and Governance: DevSecOps Basics, Secure CI/CD Pipeline, Secure Configuration Management, Enterprise Software Security Framework, Secure Software Maintenance, Security Metrics, Incident Response Basics, Software Security Best Practices.	[9]
Total Hours:	**45**

Text Book(s):

1.	Mark Graff and Kenneth R. van Wyk, "Secure Coding: Principles and Practices", O'Reilly Media, 2022.
2.	S. Subashini, S. Yogeshwari, R. Karthiga Devi, and R. Sindhiya, "Engineering Secure Software Systems", Kiwi International Publishing House, 2025.

Reference(s):

1.	Gary McGraw, "Software Security: Building Security In", Addison-Wesley Professional, 2021 (Reprint Edition).
2.	Mark Curphey, David Endler, William Hau, Steve Taylor, Tim Smith, and Alex Russell, "Web Application Security Assessment Tools", McGraw-Hill Education, 2020.
3.	Andrew Hoffman, "Web Application Security: Exploitation and Countermeasures for Modern Web Applications", O'Reilly Media, 2020.
4.	Jim Bird, "DevSecOps: A Leader's Guide to Producing Secure Software Without Compromising Flow, Feedback and Continuous Improvement", IT Revolution Press, 2022.

* SDG- 04- Quality Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Secure Software:**	
1.1	Introduction	1
1.2	Software Security vs Software Assurance	1
1.3	Need for Secure Software,	1
1.4	Common Software Threats	1
1.5	Sources of Software Vulnerabilities,	1
1.6	CIA Triad	1
1.7	Security Principles (Least Privilege, Defense in Depth)	1
1.8	Properties of Secure Software.	2
2.0	**Requirements Engineering for Secure Software**	
2.1	Introduction, Security Requirements	1
2.2	SQUARE Process Model	1
2.3	Requirements Elicitation	1
2.4	Prioritization	1
2.5	Threat Modeling Basics	1
2.6	STRIDE Model	1
2.7	Risk Assessment	1
2.8	Threat Modeling Basics	2
3.0	**Secure Software Architecture and Secure Coding**	
3.1	Secure Design Principles	1
3.2	Architectural Risk Analysis	1
3.3	Security Design Guidelines	1
3.4	Attack Patterns	1
3.5	Secure Coding Practices, Input Validation	1
3.6	Authentication & Authorization	1
3.7	Common Vulnerabilities (SQL Injection, XSS, CSRF)	1
3.8	Secure Code Review, Static Code Analysis.	2
4.0	**Software Security Testing**	
4.1	Security Testing Fundamentals	1
4.2	Static Application Security Testing (SAST)	1
4.3	Dynamic Application Security Testing (DAST)	2
4.4	Vulnerability Assessment	1
4.5	Penetration Testing Basics	1
4.6	OWASP	1
4.7	Security Testing throughout the SSDLC	2
5.0	**Secure Software Deployment and Governance**	
5.1	DevSecOps Basics	1
5.2	Secure CI/CD Pipeline	2
5.3	Secure Configuration Management	1
5.4	Enterprise Software Security Framework	1
5.5	Secure Software Maintenance	1
5.6	Security Metrics	1
5.7	Incident Response Basics,	1
5.8	Software Security Best Practices.	1

Course Designer(s)

Ms.E.Hemalatha - hemalathae@ksrct.ac.in

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60 IT E27	Cyber Laws, Privacy and Digital Ethics	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand principles of cyber law, data protection, and digital ethics.
- To develop skills in domestic and international legal frameworks for cybersecurity and cybercrime.
- To apply ethical reasoning to computing, surveillance, and data dilemmas.
- To evaluate compliance under GDPR, CCPA, and national data laws.
- To develop strategies for privacy, security, and governance using legal-policy tools.

Pre-requisites

- Basic knowledge of constitutional law, contract law, and legal systems.
- Understanding data storage, and network security concepts.
- Familiarity with ethical theories and professional responsibility.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the fundamental concepts of cyber law, privacy, and digital ethics	Understand
CO2	Assess legal frameworks addressing cyber challenges	Analyze
CO3	Apply ethical principles to cyber events, breaches, and tech dilemmas.	Apply
CO4	Design compliance policies for data protection and cybersecurity.	Apply
CO5	Analyze various legal-ethical strategies for digital governance issues	Analyze

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	2	-	2	2	1	1	-
CO2	3	2	2	2	2	2	-	-	2	-	2	2	2	3	2
CO3	3	2	2	3	3	2	-	-	2	2	2	2	2	3	2
CO4	3	2	3	3	2	2	-	-	2	2	2	2	2	2	2
CO5	3	3	3	3	3	2	-	-	2	2	2	2	3	3	3

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	6	10
Understand	10	4	10
Apply	40	40	70
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
60 IT E27- Cyber Laws, Privacy and Digital Ethics								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Foundations of Cyber Law and Digital Ethics Introduction to Cyberspace, Cyber Law, Law vs. Ethics in Computing, Jurisdiction and Sovereignty in Cyberspace, Historical Evolution of Cyber Laws, Constitutional Dimensions, Fundamental Rights, International Cyber Law and Treaties, Professional Ethics, Codes of Conduct, Role of Regulatory Bodies	[9]
Cybercrime and Digital Enforcement Classification of Cybercrimes, Hacking, Malware, and System Intrusions, Phishing, Identity Theft, Online Fraud, Cyberstalking, Harassment, Cyber Defamation, Cyber Terrorism and National Security, Digital Forensics and Investigation, Law Enforcement, Investigative Powers, Comparative Analysis of Cybercrime Laws, Victim Rights and Remedies	[9]
Privacy, Data Protection, and Surveillance Theories of Privacy, Data Protection, Personal Data: Definition and Categories, Data Protection Frameworks: GDPR, Corporate Compliance, Data Governance, Surveillance, State Access to Data, Cross-Border Data Transfers, Data Breach Notification and Accountability	[9]
Intellectual Property and Digital Commerce Introduction to Intellectual Property in Cyberspace, Copyright, Digital Content, Trademarks, Domain Names, Cybersquatting, Patents, Software Protection, E-Commerce and Electronic Contracts, Consumer Protection in E-Commerce, Fintech, Cryptocurrency, Blockchain Regulation, Digital Signatures and Authentication	[9]
Emerging Technologies, AI, and Global Governance Artificial Intelligence and Legal Frameworks, Algorithmic Accountability, Content Moderation, Online Speech, Encryption, Privacy, Security Debates, Global Internet Governance, Geopolitics and Cyber Warfare, Emerging Technologies (IoT, Metaverse, and Biometrics)	[9]
Total Hours:	**45**

Text Book(s):

1. Grabowski, M. (2026). Cyber Law and Ethics: Regulation of the Connected World (2nd ed.). Routledge.
2. Spinello, R. A. (2024). Cyberethics: Morality and Law in Cyberspace (8th ed.). Jones & Bartlett Learning.

Reference(s):

1. Solove, D. J. & Schwartz, P. M. Privacy and the Media (3rd ed.). Aspen Publishing, 2023
2. Johnson, M. Cyber Crime, Security and Digital Intelligence. Ashgate, 2013
3. Tse, H., Cyber Security Law and Guidance. Bloomsbury Press, 2018

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Foundations of Cyber Law and Digital Ethics**	
1.1	Introduction to Cyberspace, Cyber Law	1
1.2	Law vs. Ethics in Computing	1
1.3	Jurisdiction and Sovereignty in Cyberspace	1
1.4	Historical Evolution of Cyber Laws	1
1.5	Constitutional Dimensions, Fundamental Rights	1
1.6	International Cyber Law and Treaties	1
1.7	Professional Ethics	1
1.8	Codes of Conduct	1
1.9	Role of Regulatory Bodies	1
2.0	**Cybercrime and Digital Enforcement**	
2.1	Classification of Cybercrimes	1
2.2	Hacking, Malware, and System Intrusions	1
2.3	Phishing, Identity Theft, Online Fraud	1
2.4	Cyberstalking, Harassment, Cyber Defamation	1
2.5	Cyber Terrorism and National Security	1
2.6	Digital Forensics and Investigation	1
2.7	Law Enforcement, Investigative Powers	1
2.8	Comparative Analysis of Cybercrime Laws	1
2.9	Victim Rights and Remedies	1
3.0	**Privacy, Data Protection, and Surveillance**	
3.1	Theories of Privacy, Data Protection	1
3.2	Personal Data: Definition and Categories	1
3.3	Data Protection Frameworks: GDPR	1
3.4	Corporate Compliance	1
3.5	Data Governance, Surveillance	1
3.6	State Access to Data	1
3.7	Cross-Border Data Transfers	1
3.8	Data Breach Notification	1
3.9	Accountability	1
4.0	**Intellectual Property and Digital Commerce**	
4.1	Introduction to Intellectual Property in Cyberspace	1
4.2	Copyright, Digital Content	1
4.3	Trademarks, Domain Names	1
4.4	Cybersquatting, Patents, Software Protection	2
4.5	E-Commerce and Electronic Contracts	1
4.6	Consumer Protection in E-Commerce	1
4.7	Fintech, Cryptocurrency, Blockchain Regulation	1
4.8	Digital Signatures and Authentication	1
5.0	**Emerging Technologies, AI, and Global Governance**	
5.1	Artificial Intelligence and Legal Frameworks	1
5.2	Algorithmic Accountability	1
5.3	Content Moderation, Online Speech	1
5.4	Encryption, Privacy	2

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5.5	Security Debates	1
5.6	Global Internet Governance	1
5.7	Geopolitics and Cyber Warfare	1
5.8	Emerging Technologies (IoT, Metaverse, and Biometrics)	1
Course Designer: Dr.C.Nallusamy (nallusamyc@ksrct.ac.in)		

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60 IT E28	Cyber Threat Intelligence and Security Operations Center	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the concepts of cyber threats and threat intelligence.
- To learn methods for collecting and analysing threat data.
- To study Security Operations Center (SOC) architecture and functions.
- To implement incident detection and response strategies.
- To gain practical knowledge of modern security tools and frameworks.

Pre-requisites

- Basic knowledge of computer networks and understanding of cybersecurity.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand and explain different types of cyber threats and the threat intelligence lifecycle.	Remember
CO2	Analyze threats using vulnerability assessment techniques and identify Indicators of Compromise (IoCs).	Understand
CO3	Apply Security Operations Center (SOC) tools such as SIEM for monitoring and threat detection.	Apply
CO4	Demonstrate the ability to detect, respond to, and manage security incidents effectively.	Analyse
CO5	Design and implement basic SOC operations with integration of threat intelligence for real-time security.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	3	3	3	-	-	-	2	2	1	1	1	1	-
CO2	3	3	3	3	2	-	-	-	2	2	2	3	2	2	-
CO3	3	3	2	2	2	-	-	-	2	2	2	3	2	2	-
CO4	3	3	2	2	2	-	-	-	3	2	2	2	2	2	-
CO5	3	3	3	3	3	-	-	-	3	2	2	2	2	2	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	20
Understand	10	10	10
Apply	40	20	30
Analyse	-	20	40
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
60 IT E28 - Cyber Threat Intelligence and Security Operations Center								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	45	0	0	45	3	40	60	100

Introduction to Cyber Threat Intelligence Fundamentals of Cybersecurity – Types of Cyber Threats: Malware, Phishing, Ransomware – Introduction to Threat Intelligence – Types of Threat Intelligence (Strategic, Tactical, Operational) – Threat Intelligence Lifecycle – Data Collection, Processing, Analysis, Dissemination – Cyber Kill Chain – MITRE ATT&CK Framework – Open Source Intelligence (OSINT).	[9]
Threat Analysis and Vulnerability Assessment Threat Modeling – Risk Assessment Techniques – Vulnerability Scanning and Assessment Tools – Indicators of Compromise (IoCs) – Indicators of Attack (IoAs) – Malware Analysis Basics – Threat Intelligence Platforms (TIPs) – Vulnerability Management Process.	[9]
Security Operations Center (SOC) Fundamentals SOC Overview – SOC Architecture – Roles and Responsibilities of SOC Team – Security Monitoring and Logging – Log Management – Security Information and Event Management (SIEM) – Log Collection, Correlation, and Analysis – Alert Generation and Prioritization.	[9]
Incident Detection and Response Incident Response Lifecycle – Preparation, Identification, Containment, Eradication, Recovery – Detection Techniques – Alert Handling – Incident Reporting – Digital Forensics Basics – Evidence Collection and Preservation – Threat Hunting Techniques.	[9]
Advanced SOC Operations and Case Studies Security Orchestration, Automation, and Response (SOAR) – Endpoint Detection and Response (EDR) – Cloud Security Monitoring – Threat Intelligence Integration – Real-time Threat Analysis – Case Studies on Cyber Attacks – SOC Implementation Strategies – Mini Project / Practical Exposure.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Martin Lee, Cyber Threat Intelligence, 1st Edition, John Wiley & Sons, 2023.
2.	Joseph Muniz, Gary McIntyre, Nadhem AlFardan, Security Operations Center: Building, Operating, and Maintaining Your SOC, Cisco Press, 2014.

Reference(s):	
1.	Aaron Roberts, Cyber Threat Intelligence: The No-Nonsense Guide for CISOs and Security Managers, Apress, 2021.
2.	Ali Dehghantanha, Mauro Conti, Tooska Dargahi, Cyber Threat Intelligence, Springer, 2018.
3.	Florian Skopik, Collaborative Cyber Threat Intelligence, CRC Press, 2016.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Cyber Threat Intelligence**	
1.1	Fundamentals of Cybersecurity	1
1.2	Types of Cyber Threats, Malware, Phishing	1
1.3	Ransomware, Introduction to Threat Intelligence	1
1.4	Types of Threat Intelligence (Strategic, Tactical, Operational)	2
1.5	Threat Intelligence Lifecycle – Data Collection	1
1.6	Processing, Analysis, Dissemination	1
1.7	Cyber Kill Chain, MITRE ATT&CK	1
1.8	Framework, Open Source Intelligence (OSINT).	1
2.0	**Threat Analysis and Vulnerability Assessment**	
2.1	Threat Modeling,Risk Assessment Techniques	2
2.2	Vulnerability Scanning and Assessment Tools	1
2.3	Indicators of Compromise (IoCs) ,Indicators of Attack (IoAs)	2
2.4	Malware Analysis Basics	1
2.5	Threat Intelligence Platforms (TIPs)	2
2.6	Vulnerability Management Process.	1
3.0	**Security Operations Center (SOC) Fundamentals**	
3.1	SOC Overview,SOC Architecture	1
3.2	Roles and Responsibilities of SOC Team	2
3.3	Security Monitoring and Logging	1
3.4	Log Management, Security	1
3.5	Information and Event Management (SIEM)	2
3.6	Log Collection, Correlation, and Analysis	1
3.7	Alert Generation and Prioritization	1
4.0	**Incident Detection and Response**	
4.1	Incident Response Lifecycle	1
4.2	Preparation, Identification	1
4.3	Containment, Eradication, Recovery	1
4.4	Detection Techniques, Alert Handling	2
4.5	Incident Reporting, Digital Forensics Basics	1
4.6	Evidence Collection and Preservation	2
4.7	Threat Hunting Techniques	1
5.0	**Advanced SOC Operations and Case Studies**	
5.1	Security Orchestration, Automation, and Response (SOAR)	1
5.2	Endpoint Detection and Response (EDR)	2
5.3	Threat Intelligence Integration – Real-time Threat Analysis	2
5.4	SOC Implementation Strategies	1
5.5	Authentication and Authorization in MERN Applications	2
5.6	Mini Project / Practical Exposure.	1

Course Designer(s)

1. Dr.J.Mythili – mythili@ksrct.ac.in

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60 IT E37	AI for Cybersecurity	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the role of Artificial Intelligence in modern cybersecurity.
- To learn machine learning and deep learning techniques for cyber threat detection.
- To apply AI algorithms for malware detection, phishing identification, and intrusion detection.
- To design intelligent cybersecurity solutions using AI frameworks and automation tools.
- To analyze the ethical, legal, and security challenges of AI- driven cybersecurity systems.

Pre- requisites

- Basic knowledge of Python programming and problem- solving.
- Familiarity with computer networks, operating systems, and cybersecurity fundamentals.
- Basic understanding of machine learning concepts and data analysis.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand AI concepts and cybersecurity fundamentals.	Understand
CO2	Apply machine learning algorithms for cyber threat detection.	Apply
CO3	Develop AI models for malware, phishing and intrusion detection.	Apply
CO4	Analyse adversarial attacks, threat intelligence and AI security risks.	Analyse
CO5	Design intelligent AI- enabled cybersecurity systems for real- world applications.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	-	-	-	-	2	1	1	1	2	1	-
CO2	3	3	3	2	3	1	-	-	2	1	2	2	3	2	1
CO3	3	3	3	3	3	2	-	-	2	2	2	2	3	3	2
CO4	2	3	2	3	2	2	-	1	2	2	2	2	2	3	2
CO5	3	3	3	3	3	2	1	1	2	2	3	3	3	3	2

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	5	10
Understand	10	10	15
Apply	30	30	45
Analyse	10	15	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology - Autonomous R2022								
B. Tech - Information Technology								
60 IT E37- AI for Cybersecurity								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Foundations of AI in Cybersecurity Introduction to Cybersecurity - Cyber Threat Landscape - Evolution of AI in Cybersecurity - AI vs Traditional Security Systems - Machine Learning Fundamentals - Supervised Learning - Unsupervised Learning - Reinforcement Learning - Feature Engineering - Security Datasets - Data Collection - Data Preprocessing - Model Evaluation Metrics.	[9]
Machine Learning for Threat Detection Classification Algorithms - Decision Trees - Random Forest - Support Vector Machine - Naive Bayes - K- Means Clustering - Anomaly Detection - Intrusion Detection Systems (IDS) - Network Traffic Analysis - Log Analysis - Feature Selection - Model Training - Performance Evaluation - AI- assisted Threat Detection.	[9]
Deep Learning for Cyber Defense Deep Learning Fundamentals - Artificial Neural Networks - Convolutional Neural Networks (CNN) - Recurrent Neural Networks (RNN) - Long Short - Term Memory (LSTM) - Malware Classification - Ransomware Detection - Phishing Website Detection - Email Spam Detection - Behavioral Analytics - AI- powered Endpoint Protection.	[9]
AI Security, Threat Intelligence and Automation Threat Intelligence Platforms - Security Information and Event Management (SIEM) - User and Entity Behavior Analytics (UEBA) - Security Orchestration, Automation and Response (SOAR) - Explainable AI (XAI) - Adversarial Machine Learning - Model Poisoning - Evasion Attacks - AI Model Security - Privacy Preserving Machine Learning.	[9]
Generative AI and Future Cybersecurity Applications Large Language Models (LLMs) in Cybersecurity - AI Security Assistants - Security Chatbots - Vulnerability Assessment using AI - Automated Penetration Testing - AI for Digital Forensics - AI in Cloud Security - AI for IoT Security - Case Studies - Ethical and Legal Issues - Future Trends in AI-driven Cybersecurity.	[9]
Total Hours:	**45**

Text Book(s):

1. Leslie F. Sikos, AI in Cybersecurity, Springer, 2024.
2. Clarence Chio and David Freeman, Machine Learning and Security, O'Reilly Media, 2018.
3. Soma Halder and Sinan Ozdemir, Hands-On Machine Learning for Cybersecurity, Packt Publishing, 2018.

Reference(s):

1. Michael Bishop, Computer Security: Art and Science, Addison-Wesley, 2nd Edition.
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press.
3. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow, 3rd Edition, O'Reilly, 2023.
4. NIST Artificial Intelligence Risk Management Framework (AI RMF).
5. ENISA Reports on AI and Cybersecurity.

R.P

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Foundations of AI in Cybersecurity**	
1.1	Introduction to Cybersecurity and Threat Landscape	1
1.2	Role of Artificial Intelligence in Cybersecurity	1
1.3	Machine Learning Fundamentals	1
1.4	Learning Paradigms	1
1.5	Security Datasets	1
1.6	Feature Engineering	1
1.7	Data Preprocessing	1
1.8	Model Evaluation Metrics	1
1.9	Case Study	1
2.0	**Machine Learning for Threat Detection**	
2.1	Classification Algorithms	1
2.2	Decision Trees and Random Forest	1
2.3	Support Vector Machine	1
2.4	Naive Bayes	1
2.5	Clustering Techniques	1
2.6	Intrusion Detection Systems	1
2.7	Network Traffic Analysis	1
2.8	Log Analysis	1
2.9	Threat Detection Project	1
3.0	**Deep Learning for Cyber Defense**	
3.1	Artificial Neural Networks	1
3.2	Convolutional Neural Networks (CNN)	1
3.3	Recurrent Neural Networks (RNN) and Long Short-Term Memory (LSTM)	1
3.4	Malware Detection	1
3.5	Phishing Detection	1
3.6	Spam Detection	1
3.7	Behavioral Analytics	1
3.8	Endpoint Protection	1
3.9	Mini Case Study	1
4.0	**AI Security and Automation**	
4.1	Threat Intelligence	1
4.2	Security Information and Event Management (SIEM)	1
4.3	User and Entity Behavior Analytics (UEBA)	1
4.4	Security Orchestration, Automation and Response (SOAR)	1
4.5	Explainable Artificial Intelligence (XAI)	1
4.6	Adversarial Artificial Intelligence	1
4.7	Model Poisoning Attacks	1
4.8	Privacy-Preserving Machine Learning	1
4.9	Industry Case Study	1
5.0	**Generative AI for Cybersecurity**	
5.1	Large Language Models (LLMs) in Cybersecurity	1
5.2	AI Security Assistants	1
5.3	Vulnerability Assessment using AI	1

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5.4	Automated Penetration Testing	1
5.5	AI for Digital Forensics	1
5.6	AI for Cloud Security	1
5.7	AI for IoT Security	1
5.8	Ethical and Legal Issues in AI-driven Cybersecurity	1
5.9	Future Trends and Capstone Case Study	1

Course Designer(s)

1. Ms.B.Srimirnaaliny - srimirnaalinyb@ksrct.ac.in

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60 IT E47	CRYPTANALYSIS	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To Understand the principles and objectives of cryptanalysis.
- To Study attacks on classical and modern cryptographic algorithms.
- To Analyse the security of symmetric and asymmetric cryptosystems.
- To Explore practical cryptanalytic techniques and tools.
- To Develop the ability to evaluate and improve cryptographic security.

Pre-requisites

- Basic knowledge of Computer Networks and Network Security.
- Familiarity with Python, C/C++, or Java.
- Basic understanding of Data Structures and Algorithms

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the principles and techniques of cryptanalysis.	Understand
CO2	Analyze vulnerabilities in classical and modern cryptographic algorithms.	Apply
CO3	Apply statistical and mathematical methods to recover cryptographic keys.	Apply
CO4	Evaluate the security of symmetric and asymmetric cryptographic systems.	Analyse
CO5	Perform practical cryptanalysis using appropriate tools while following ethical guidelines.	Apply

Mapping with Programme Outcomes

COs	POs											PSOs		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	3	2	-	2	-	-	-	-	-	-	-	2	2	2
CO2	3	3	2	2	2	-	-	-	-	-	-	3	2	2
CO3	3	3	3	3	2	-	-	2	-	-	-	3	3	2
CO4	3	3	2	3	2	-	-	2	-	-	-	3	3	2
CO5	2	3	3	3	3	-	-	2	-	-	-	3	3	3

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	6	10
Understand	10	4	10
Apply	40	40	70
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

Rev. No.1/w.e.f. 13.06.2026
Approved Passed in BoS Meeting held on 06.05.2026
in Academic Council Meeting held on 13.06.2026

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022								
B. Tech – Information Technology								
60 IT E47 - Cryptanalysis								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Introduction to Cryptanalysis Fundamentals of Cryptography and Cryptanalysis, Security Goals and Threat Models, Types of Cryptanalytic Attacks, Ciphertext-only attack, Known-plaintext attack, Chosen-plaintext attack, Chosen-ciphertext attack, Computational Complexity and Security, Historical Perspective of Codebreaking.	[9]
Classical Cipher Cryptanalysis Frequency Analysis, Monoalphabetic and Polyalphabetic Cipher Attacks, Caesar Cipher Analysis, Affine Cipher Analysis, Vigenère Cipher Cryptanalysis, Hill Cipher Attacks, Playfair Cipher Cryptanalysis, Statistical Methods in Classical Cryptanalysis.	[9]
Symmetric Key Cryptanalysis Block Cipher Design Principles, Differential Cryptanalysis, Linear Cryptanalysis, Integral Cryptanalysis, Meet-in-the-Middle Attack, Biclique Attack, Side-Channel Attacks, Timing Attacks, Power Analysis, Electromagnetic Analysis, Case Studies: DES and AES.	[9]
Public Key Cryptanalysis Security of RSA, Integer Factorization Algorithms, Pollard's Rho Algorithm, Quadratic Sieve, Number Field Sieve, Attacks on RSA, Low Public Exponent Attack, Common Modulus Attack, Padding Oracle Attack, Elliptic Curve Cryptanalysis, Lattice-Based Attacks.	[9]
Advanced Cryptanalysis and Emerging Topics Hash Function Cryptanalysis, Collision and Preimage Attacks, Password Cracking Techniques, Cryptanalysis of Lightweight Cryptography, Quantum Cryptanalysis, Shor's Algorithm, Grover's Algorithm, AI and Machine Learning in Cryptanalysis, Recent Research Trends, Ethical Issues and Responsible Disclosure.	[9]
Total Hours:	**45**

Text Book(s):

1. Christof Paar and Jan Pelzl, Understanding Cryptography: A Textbook for Students and Practitioners, Springer, 2010.
2. Douglas R. Stinson and Maura Paterson, Cryptography: Theory and Practice, 4th Edition, CRC Press, 2018.

Reference(s):

1. Jonathan Katz and Yehuda Lindell, Introduction to Modern Cryptography, 3rd Edition, CRC Press, 2020.
2. William Stallings, Cryptography and Network Security: Principles and Practice, 8th Edition, Pearson, 2020.
3. Jean-Philippe Aumasson, Serious Cryptography: A Practical Introduction to Modern Encryption, No Starch Press, 2017.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction to Cryptanalysis**	
1.1	Fundamentals of Cryptography and Cryptanalysis	1
1.2	Security Goals and Threat Models	1
1.3	Types of Cryptanalytic Attacks	1
1.4	Ciphertext-only attack	1
1.5	Known-plaintext attack	1
1.6	Chosen-plaintext attack	1
1.7	Chosen-ciphertext attack	1
1.8	Computational Complexity and Security	1
1.9	Historical Perspective of Codebreaking	1
2.0	**Classical Cipher Cryptanalysis**	
2.1	Frequency Analysis	1
2.2	Monoalphabetic Cipher Attacks	1
2.3	Polyalphabetic Cipher Attacks	1
2.4	Caesar Cipher Analysis	1
2.5	Affine Cipher Analysis	1
2.6	Vigenère Cipher Cryptanalysis	1
2.7	Hill Cipher Attacks	1
2.8	Playfair Cipher Cryptanalysis	1
2.9	Statistical Methods in Classical Cryptanalysis	1
3.0	**Symmetric Key Cryptanalysis**	
3.1	Block Cipher Design Principles	1
3.2	Differential Cryptanalysis	1
3.3	Linear Cryptanalysis	1
3.4	Integral Cryptanalysis	1
3.5	Meet-in-the-Middle Attack	1
3.6	Biclique Attack	1
3.7	Side-Channel Attacks	1
3.8	Timing Attacks, Power Analysis	1
3.9	Electromagnetic Analysis	1
4.0	**Public Key Cryptanalysis**	
4.1	Security of RSA	1
4.2	Integer Factorization Algorithms	1
4.3	Pollard's Rho Algorithm	1
4.4	Quadratic Sieve	1
4.5	Number Field Sieve	1
4.6	Attacks on RSA, Low Public Exponent Attack	1
4.7	Common Modulus Attack, Padding Oracle Attack	1
4.8	Elliptic Curve Cryptanalysis	1
4.9	Lattice-Based Attacks	1
5.0	**Advanced Cryptanalysis and Emerging Topics**	
5.1	Hash Function Cryptanalysis	1

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5.2	Collision and Preimage Attacks	1
5.3	Password Cracking Techniques	1
5.4	Cryptanalysis of Lightweight Cryptography	1
5.5	Quantum Cryptanalysis, Shor's Algorithm	1
5.6	Grover's Algorithm	1
5.7	AI and Machine Learning in Cryptanalysis	1
5.8	Recent Research Trends	1
5.9	Ethical Issues and Responsible Disclosure	1

Course Designer(s)

1. Mr.K.Saravanan – saravanank@ksrct.ac.in

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60 IT E19	Data Warehousing and Mining	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the principles of Data warehousing and Data Mining.
- To be familiar with the Data warehouse architecture and its Implementation.
- To know the Architecture of a Data Mining system.
- To understand the various Data preprocessing Methods.
- To perform classification and prediction of data.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain the components, architecture, schemas, and tools of data warehousing and perform multidimensional data analysis using OLAP and reporting tools.	Remember
CO2	Apply data mining functionalities and preprocessing techniques including data cleaning, integration, transformation, reduction, and discretization to prepare data for mining.	Understand
CO3	Implement efficient frequent itemset mining techniques and analyze different types of association rules using correlation and constraint-based mining approaches.	Analyse
CO4	Demonstrate classification and prediction techniques using decision trees, Bayesian classification, rule-based methods, Support Vector Machines, and ensemble methods, and evaluate their performance using appropriate accuracy measures.	Analyse
CO5	Apply clustering and outlier analysis techniques to different types of data and demonstrate mining techniques for spatial, multimedia, text, web, and other complex data sources.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	2	-	-	-	-	-	-	3	-	-
CO2	3	2	3	-	-	-	2	-	3	-	-	-	-	3	-
CO3	3	2	2	-	-	-	-	-	-	2		2	-	-	3
CO4	3	2	2	2	-	-	-	2	-	-	1	-	-	-	-
CO5	3	2	2	-	2	2	-	-	-	-		-	-	-	-

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	10
Understand	40	20	20
Apply	-	20	60
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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in Academic Council Meeting held on 13.06.2026

Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
60 IT E19-Data Warehousing and Mining								
IT								
Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.	[9]
Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation- Architecture of A Typical Data Mining Systems- Classification of Data Mining Systems. **Association Rule Mining**: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.	[9]
Classification and Prediction: Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.	[9]
Cluster Analysis: Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.	[9]
Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.	[9]
Total Hours:	**45**

Text Book(s):

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining: Concepts and Techniques", 4th Edition, Morgan Kaufmann Publishers, Elsevier, 2023.
2. Pang-Ning Tan, Michael Steinbach, Anuj Karpatne and Vipin Kumar, "Introduction to Data Mining", 2nd Edition, Pearson Education, 2018.

Reference(s):

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kaufmann Publishers, Elsevier, 2012.
2. Ralph Kimball and Margy Ross, "The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling", 3rd Edition, Wiley, 2013.
3. https://docs.oracle.com/en/database/
4. https://www.ibm.com/docs/en

*SDG 4 – Quality in Education

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Introduction**	
1.1	Introduction to data mining and data Warehousing Components	1
1.2	Building a Data Warehouse	1
1.3	Data Warehouse Architecture (combined with Building a Data Warehouse)	1
1.4	DBMS Schemas for Decision Support	1
1.5	Data Extraction, Cleanup and Transformation Tools	1
1.6	Metadata, Reporting, and Query Tools	1
1.7	Online Analytical Processing (OLAP)	2
1.8	OLAP and Multidimensional Data Analysis	1
2.0	**Data Mining and Association Rule Mining**	
2.1	Introduction to Data Mining	1
2.2	Data Mining Functionalities	1
2.3	Data Preprocessing	1
2.4	Data Cleaning, Integration, and Transformation	1
2.5	Data Reduction, Discretization, and Concept Hierarchy Generation	1
2.6	Architecture and Classification of Data Mining Systems	1
2.7	Introduction to Association Rule Mining	1
2.8	Frequent Itemset Mining Methods and Association Rules	1
2.9	Correlation Analysis and Constraint-Based Association Mining	1
3.0	**Classification and Prediction**	
3.1	Introduction to Classification and Prediction	1
3.2	Decision Tree Classification	1
3.3	Bayesian and Rule-Based Classification	1
3.4	Classification by Backpropagation and Support Vector Machines	1
3.5	Associative Classification and Lazy Learners	1
3.6	Prediction Techniques	1
3.7	Accuracy, Error Measures and Classifier Evaluation	2
3.8	Ensemble Methods and Model Selection	1
4.0	**Cluster Analysis**	
4.1	Introduction to Cluster Analysis	1
4.2	Types of Data in Cluster Analysis	1
4.3	Categorization of Major Clustering Methods	1
4.4	Partitioning Methods- Hierarchical Methods	2
4.6	Density-Based and Grid-Based Methods	1
4.7	Model-Based Clustering Methods	1
4.8	Clustering High-Dimensional Data and Constraint-Based Cluster Analysis	2
4.9	Outlier Analysis	1
5.0	**Mining Object, Spatial, Multimedia, Text and Web Data**	
5.1	Introduction to Complex Data Mining	1
5.2	Multidimensional Analysis and Descriptive Mining of Complex Data Objects	1
5.3	Spatial Data Mining - Spatial Data Analysis and Mining Techniques	2
5.5	Multimedia Data Mining	1
5.6	Text Mining and Text Analysis	1
5.7	Web Data Mining and Web Content Analysis	2
5.8	Mining the World Wide Web	1

Course Designer(s)

1. Ms. G. K. Abhinaya - abhinayagk@ksrct.ac.in

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in Academic Council Meeting held on 13.06.2026

60 IT E46	Business Intelligence	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To identify technology and processes associated with Business Intelligence framework
- To study the concepts of data warehousing and data Integration techniques
- To apply the multi-dimensional data modeling techniques and its business metrics
- To design an enterprise dashboard using open source/MS Office
- To understand the applications of BI and Cloud Computing

Pre-requisites

- Basic knowledge of Business Intelligence

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Design and implement OLTP, OLAP, data warehouse and BI concepts.	Apply
CO2	Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data.	Analyse
CO3	Outline the definitions, concepts, information visualization and techniques of multi-dimensional data modeling.	Understand
CO4	Design an enterprise dashboard using open source/MS Office and decision making	Analyse
CO5	Apply big data technologies in business intelligence using cloud computing and creating a new opportunity for entrepreneurship for analytics	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	-	-	2	-	-	-	-	-	-	3	-	-
CO2	2	2	-	-	-	-	1	-	-	-	-	-	-	2	-
CO3	2	1	-	-	-	-	-	-	-	2	-	-	-	-	1
CO4	2	2	-	1	-	-	-	2	-	-	1	-	-	-	-
CO5	2	2	-	-	2	-	-	-	2	-	-	1	-	-	-
3 - Strong; 2 - Medium; 1 - Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	30	20	20
Apply	20	20	20
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	10	10	10

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Syllabus

K.S. Rangasamy College of Technology – Autonomous R2022								
B. Tech-Information Technology								
60 IT E46 - Business Intelligence								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	**T**	**P**		**C**	**CA**	**ES**	**Total**
VII	3	0	0	45	3	40	60	100

Introduction Introduction to Digital Data - Introduction - Types of Data - Introduction to OLTP and OLAP- OLTP vs OLAP - Different OLAP Architectures - Data Models for OLTP and OLAP - OLAP Operations on Multidimensional Data - BI BI Definitions and Concepts - BI Component Framework - Data Warehousing Concepts and its Role in BI - BI Roles and Responsibilities - Business Intelligence Applications	[9]
Data Integration Introduction to Data Warehouse - Data Integration - Data Integration Technologies - Data Quality- Data Profiling - ---Kettle Software: Introduction to ETL using Pentaho Data Integration.	[9]
Multi-Dimensional Data Modeling Introduction - Data Modeling Basics – Types – Techniques - Fact and Dimension Tables - Dimensional Models - Introduction to Measures and Metrics - Introduction to Business Metrics and KPIs - KPI Usage in Companies - Creating Cubes using Microsoft Excel.	[9]
Enterprise Reporting Reporting Perspectives - Enterprise Reporting Characteristics - Malcolm Baldrige Framework -, Balanced Scorecard - Enterprise Dashboard - Balanced Scorecard vs. Enterprise Dashboard - Enterprise Reporting using MS Access / MS Excel.	[9]
BI Applications and Case Studies Understanding BI and Mobility - BI and Cloud Computing - BI for ERP System - Social CRM and BI - Case Study: Good Lift HealthCare group - TentoTen Retail Stores.	[9]
Total Hours:	**45**

Text Book(s):

1.	RN Prasad and Seema Acharya, “Fundamental of Business Analytics”, Wiley India, 2011.
2.	Wilfriend Grossman and Stefanie Rinderle-MA,” Fundamentals of Business Analytics”, Wiley India,2015

Reference(s):

1.	John Boyer, Bill Frank, Brian Green, Tracy Harris, and Kay Van De Vanter, “Business Intelligence Strategy: A Practical Guide for Achieving BI Excellence”, IBM Corporation, 2010.
2.	Swain Scheps, “Business Intelligence for Dummies”, Wiley Publishing Inc, 2008
3.	Cindi Howson, “Successful Business Intelligence: Secrets to making BI a killer App”, McGraw Hill,2008.
4.	https://learningenglish.britishcouncil.org/en/listening

*SDG 9 – Industry Innovation and Infrastructure
**SDG 3 – Good Health and Well Being
***SDG 7 – Affordable and Clean Energy

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Course Contents and Lecture Schedule		
S. No.	**Topics**	**No. of hours**
1	**Introduction**	
1.1	Introduction to Digital Data, Types of Data	1
1.2	Introduction to OLTP and OLAP, OLTP vs OLAP	1
1.3	Different OLAP Architectures	1
1.4	Data Models for OLTP and OLAP - OLAP Operations on Multidimensional Data	1
1.5	BI Definitions and Concepts	1
1.6	BI Component Framework	1
1.7	Data Warehousing Concepts and its Role in BI	1
1.8	BI Roles and Responsibilities	1
1.9	Business Intelligence Applications	1
2	**Data Integration**	
2.1	Introduction to Data Warehouse	1
2.2	Data Integration	1
2.3	Data Integration Technologies	1
2.4	Data Quality	1
2.5	Data Profiling	1
2.6	Introduction to Kettle Software	1
2.7	Kettle Software	1
2.8	Introduction to ETL	1
2.9	Introduction to ETL using Pentaho Data Integration.	1
3	**Multi-Dimensional Data Modeling**	
3.1	Introduction - Data Modeling Basics	1
3.2	Types – Techniques	1
3.3	Fact and Dimension Tables	1
3.4	Dimensional Models	1
3.5	Introduction to Measures and Metrics	1
3.6	Introduction to Business Metrics	1
3.7	KPIs	1
3.8	KPI Usage in Companies	1
3.9	Creating Cubes using Microsoft Excel	1
4	**Enterprise Reporting**	
4.1	Reporting Perspectives	1
4.2	Enterprise Reporting Characteristics	1
4.3	Malcolm Baldrige Framework	1
4.4	Balanced Scorecard	1
4.5	Enterprise Dashboard	1
4.6	Balanced Scorecard	1
4.7	Enterprise Dashboard	1
4.8	Enterprise Reporting using MS Access	1
4.9	Enterprise Reporting using MS Excel	1
5	**BI Applications and Case Studies**	
5.1	Introduction to BI Application	1
5.2	Understanding BI and Mobility	1
5.3	BI and Cloud Computing	1
5.4	BI for ERP System	1
5.5	Social CRM and BI	1

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5.6	Case Study: Good Lift HealthCare group	1
5.7	Case Study: Library System	1
5.8	Case Study: Hospital Management	1
5.9	TentoTen Retail Stores.	1
	Total Hours	**45**

Course Designer(s)

1. Mr.K.Saravanan (saravanank@ksrct.ac.in)

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60 IT E53	Social Network Analysis	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To formalize the different types of entities and relationships as nodes and edges and represent this information as relational data.
- To understand the fundamental concepts in analyzing the large-scale data that are derived from social networks.
- To understand the basic concepts and principles of different theoretical models of social networks analysis.
- To transform data for analysis using graph-based and statistics-based social network measures.
- To choose among social network designs based on research goals.

Pre-requisites

- Computer Network

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Plan and execute network analytical computations.	Understand
CO2	Implement mining algorithms for social networks	Apply
CO3	Analyse and evaluate social communities	Apply
CO4	Use social network analysis in behavior analytics	Apply
CO5	Perform mining on large social networks and illustrate the results	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	3	-	2	3	3	-	3	3	3	2
CO2	3	3	3	3	2	2	-	2	3	2	-	3	3	3	3
CO3	3	3	3	3	3	2	-	2	3	3	-	3	3	3	3
CO4	3	3	3	3	3	3	-	-	3	3	-	3	3	3	3
CO5	3	3	3	3	3	3	-	-	3	-	-	3	-	3	-
3 - Strong; 2 - Medium; 1 – Some															

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	10	10
Understand	20	20	20
Apply	30	30	60
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E53 – Social Network Analysis								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Graph Theory and Structure* Algorithm : Breadth First Search (BFS), Strongly Connected Components (SCC), Weakly Connected Components (WCC) - First Set of Experiments - Second Set of Experiments - Degree Distributions - Number of Breadth First Searches – Exponent: Rank Exponent R, Out-Degree Exponent, O. Hop Plot Exponent, H. Eigen Exponent, E. Permutation Model.	[9]
Social Network Graph Analysis Social Network Exploration - Processing and Properties - Finding Overlapping Communities - Graph Nodes - Similarity Between Graph Nodes - Counting Triangles in Graphs - Neighbourhood Properties of Graphs - Pregel Paradigm - Apache Giraph Graph Processing System.	[9]
Information Diffusion In Social Networks* Strategic Network Formation: Game Theoretic Models for Network Creation, User Behavior in Social Networks - Information Diffusion in Graphs: Cascading Behavior, Spreading, Epidemics, Heterogeneous Social Network Mining, Influence Maximization, Outbreak Detection - Opinion Analysis on Social Networks: Contagion, Opinion Formation, Coordination and Cooperation.	[9]
Cascading in Social Networks* Cascading in Social Networks - Decision Based Models of Cascade - Collective Action - Cascade Capacity - Co-existence of Behaviours - Cascade Capacity with Bilinguality - Probabilistic Models of Cascade - Branching Process - Basic Reproductive Number.	[9]
Link Analysis & Community Detection Crawling – Searching - Web Spam Pages Strength of Weak Ties - Triadic Closure - Detecting Communities in a Network - Girvan-Newman Algorithm - Minimum Cut Trees - Tie Strengths in Mobile Communication Network - Exact Betweenness Centrality.	[9]
Total Hours:	**45**

Text Book(s):	
1.	Stephen P. Borgatti, Martin G. Everett, and Jeffrey C ,"Analyzing Social Networks" , Johnson,2nd Edition, 2013
2.	Charles Kadushin ,"Understanding Social Networks: Theories, Concepts, and Findings",1st Edition, 2012
Reference(s):	
1.	Charu C. Aggarwal ,"Social Network Data Analytics", 1st Edition, 2011
2.	David Easley and Jon Kleinberg , "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", 1st Edition, 2010

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Graph Theory and Structure**	
1.1	Breadth First Search (BFS)	1
1.2	Strongly Connected Components (SCC)	1
1.3	Weakly Connected Components (WCC)	1
1.4	First Set of Experiments and Second Set of Experiments	1
1.5	Degree Distributions	1
1.6	Number of Breadth First Searches	1
1.7	Rank Exponent R and Out-Degree Exponent	1
1.8	O. Hop Plot Exponent and H. Eigen Exponent	1
1.9	E. Permutation Model	1
2.0	**Social Network Graph Analysis**	
2.1	Social Network Exploration	1
2.2	Processing and Properties	1
2.3	Finding Overlapping Communities	1
2.4	Graph Nodes	1
2.5	Similarity Between Graph Nodes	1
2.6	Counting Triangles in Graphs	1
2.7	Neighbourhood Properties of Graphs	1
2.8	Pregel Paradigm	1
2.9	Apache Giraph Graph Processing System	1
3.0	**Information Diffusion in Social Networks**	
3.1	Strategic Network Formation: Game Theoretic Models for Network Creation	1
3.2	User Behavior in Social Networks	1
3.3	Information Diffusion in Graphs: Cascading Behavior	1
3.4	Spreading and Epidemics	1
3.5	Heterogeneous Social Network Mining	1
3.6	Influence Maximization	1
3.7	Outbreak Detection	1
3.8	Opinion Analysis on Social Networks: Contagion, Opinion Formation	1
3.9	Coordination and Cooperation	1
4.0	**Cascading in Social Networks**	
4.1	Cascading in Social Networks	1
4.2	Decision Based Models of Cascade	1
4.3	Collective Action	1
4.4	Cascade Capacity	1
4.5	Co-existence of Behaviours	1
4.6	Cascade Capacity with Bilinguality	1
4.7	Probabilistic Models of Cascade	1
4.8	Branching Process	1
4.9	Basic Reproductive Number	1
5.0	**Link Analysis & Community Detection**	
5.1	Crawling	1

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5.2	Searching Principle	1
5.3	Web Spam Pages Strength of Weak Ties	1
5.4	Triadic Closure	1
5.5	Detecting Communities in a Network	1
5.6	Girvan-Newman Algorithm	1
5.7	Minimum Cut Trees	1
5.8	Tie Strengths in Mobile Communication Network	1
5.9	Exact Betweenness Centrality	1

Course Designer(s)

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60 IT E30	Data Privacy and Security	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the basic concepts of data security (CIA Triad) and how it differs from data privacy.
- To identify various cyber threats, attacks, and vulnerabilities that compromise data.
- To apply encryption, hashing, and access control techniques for protecting data.
- To learn and compare key privacy laws like GDPR and India's DPDP Act 2023.
- To implement privacy-by-design principles and conduct risk assessments for data protection.

Pre-requisites

- Basic understanding of computer systems, networks, and the internet.
- Familiarity with fundamental mathematics for cryptography.
- Working knowledge of any one programming language to understand basic implementation concepts.
- Knowledge of data science, cybersecurity basics, and data protection laws.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand data privacy and security by explaining the CIA Triad, data classification, the privacy lifecycle, and stakeholder roles.	Remember
CO2	Analyze cyber threats, system vulnerabilities, social engineering, and emerging vectors, and propose countermeasures and resilience strategies.	Understand
CO3	Apply encryption, hashing, PKI, authentication mechanisms, and access control models to design data protection strategies.	Apply
CO4	Compare and contrast the provisions, principles, and data subject rights under GDPR and India's DPDP Act 2023.	Analyse
CO5	Assess privacy challenges posed by AI, IoT, Blockchain, and Cloud, and design privacy-preserving solutions using privacy-by-design and risk assessments.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	2	2	2	2	2		2	2	2	3	3	2
CO2	2	3	2	2	2	2	2	3		2	2	2	3	3	2
CO3	3	2	3	2	3	3	2	2		2	2	2	3	3	2
CO4	2	2	2	2	2	2	2	3		2	3	2	3	3	2
CO5	2	3	3	2	3	3	3	2		2	2	2	3	2	2

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	10
Understand	40	10	20
Apply	-	20	40
Analyse	-	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022

B. Tech – Information Technology

60 IT E30 - Data Privacy and Security

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Fundamentals of Data Privacy and Security Introduction to data privacy and security, Privacy vs Security, Core Principles of Security (Confidentiality, Integrity, and Availability (CIA Triad), Principles of Least Privilege and Defense-in-Depth), Types of data: public, personal, sensitive, critical and anonymized data, Importance of data privacy, The Data Privacy Lifecycle, Roles and Responsibilities of Stakeholders.	[9]
Threats and Vulnerabilities to Data Privacy Threats: (Phishing, Malware, Ransomware, Insider breach), Vulnerabilities in Systems and Networks, Insider Threats and Social Engineering, Impact of Data Breaches on Privacy, Emerging Threat Vectors (Cloud, IoT, and mobile applications) Countermeasures and Resilience Strategies	[9]
Strategies and Techniques for Data Protection Symmetric vs Asymmetric encryption, Hashing, Digital Signatures, and Public Key Infrastructure (PKI), End-to-End Encryption, Authentication Mechanisms: MFA, biometric and Single-Sign-on (SSO), Access Control Models: Role-Based Access Control (RBAC) and Attribute-Based Access Control (ABAC)	[9]
Data Protection Laws: Principles, Rights, and Framework General Data Protection Regulation (GDPR), Indian Privacy Framework: IT Act and its provisions for data privacy, Personal Data Protection Bill, Principles of Data Protection (Data Minimization, Transparency), Rights of Data Subjects (Access, Rectification, Erasure)	[9]
Emerging Trends and Challenges in Data Privacy and Security The Impact of Artificial Intelligence on Privacy, IoT Privacy Risks, Managing Data in IoT, Blockchain and Data Privacy, Cloud Security	[9]
Total Hours:	**45**

Text Book(s):

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education, 8th Edition, 2024.
2. Daniel J. Solove, Paul M. Schwartz, Information Privacy Law, Aspen Publishing, 8th Edition, 2024.

Reference(s):

1. Yogesh V. Nayyar, "*The Digital Personal Data Protection Act, 2023*", Whitesmann, 2nd Edition, 2026.
2. Daniel J. Solove, Woodrow Hartzog, "Breached! Why Data Security Law Fails and How to Improve It", Oxford University Press, 1st Edition, 2022.
3. Samiksha Shukla, Jossy P. George, Kapil Tiwari, Joseph Varghese Kureethara, "Data Ethics and Challenges", Springer, 1st Edition, 2022.
3. Daniel J. Solove, Paul M. Schwartz, "*EU Data Protection and the GDPR*", Aspen Publishers, 2nd Edition, 2024.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Fundamentals of Data Privacy and Security**	
1.1	Introduction to Data Privacy and Security	1
1.2	Privacy vs Security	1
1.3	Core Principles of Security – CIA Triad	1
1.4	Triad Principles of Least Privilege	1
1.5	Defense-in-Depth Strategy	1
1.6	Types of Data – Public, Personal, Sensitive, Critical and Anonymized Data	1
1.7	Importance of Data Privacy	1
1.8	The Data Privacy Lifecycle	1
1.9	Roles and Responsibilities of Stakeholders	1
2.0	**Threats and Vulnerabilities to Data Privacy**	
2.1	Introduction to Cyber Threats & Phishing	1
2.2	Malware and Ransomware	1
2.3	Insider Breaches & Vulnerabilities in Systems	1
2.4	Insider Threats & Social Engineering – Deep Dive	1
2.5	Impact of Data Breaches on Privacy	1
2.6	Emerging Threat Vectors – Cloud and IoT	1
2.7	Emerging Threat Vectors – Mobile Applications & Combined Risks	1
2.8	Countermeasures	1
2.9	Resilience Strategies	1
3.0	**Strategies and Techniques for Data Protection**	
3.1	Introduction to Cryptography & Symmetric Encryption	1
3.2	Asymmetric Encryption & Key Differences	1
3.3	Hashing – Ensuring Data Integrity	1
3.4	Digital Signatures & Public Key Infrastructure (PKI)	1
3.5	End-to-End Encryption (E2EE)	1
3.6	Authentication Mechanisms – Passwords & MFA	1
3.7	Biometric Authentication & Single Sign-On (SSO)	1
3.8	Access Control Models – RBAC	1
3.9	Attribute-Based Access Control	1
4.0	**Data Protection Laws: Principles, Rights, and Framework**	
4.1	Introduction to Data Protection Laws & GDPR Overview	1
4.2	GDPR – Core Principles of Data Protection	1
4.3	GDPR – Rights of Data Subjects	1
4.4	GDPR – Rights of Data Subjects & Enforcement	1
4.5	Indian Privacy Framework – The IT Act, 2000	1
4.6	Indian Privacy Framework – IT Rules, 2011 & Evolution to DPDP	1
4.7	Digital Personal Data Protection (DPDP) Act, 2023 – Overview & Principles	1
4.8	DPDP Act, 2023 – Rights of Data Subjects & Obligations	1
4.9	DPDP Act, 2023 – Exemptions, Enforcement	1
5.0	**Emerging Trends and Challenges in Data Privacy and Security**	
5.1	AI and Privacy – An Overview of the Challenges	1
5.2	AI-Specific Privacy Threats and Mitigation	1
5.3	IoT Privacy Risks – The Landscape	1

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5.4	Managing Data in IoT – Security and Privacy Strategies	1
5.5	Advanced IoT Security – AI, Blockchain, and IoT 2.0	1
5.6	Blockchain and Data Privacy – Challenges and Solutions	1
5.7	Cloud Security – Foundations and Shared Responsibility	1
5.8	Cloud Security – IAM	1
5.9	Cloud Security – Encryption, and Best Practices	1

Course Designer(s)

1. Mr.R.T.Dinesh Kumar – dineshkumarrt@ksrct.ac.in

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60 IT E38	Data Curation and Visualization	Category	L	T	P	Credit
		PE	3	0	0	3

Objectives

- To understand the principles of data collection, data quality, data preprocessing, and data governance.
- To develop skills in cleaning, integrating, transforming, and managing structured and unstructured data.
- To apply data visualization techniques for effective communication of insights using appropriate charts and dashboards.
- To analyze data using exploratory data analysis (EDA) and visualization tools for informed decision making.
- To explore modern trends in data visualization, storytelling, AI-assisted analytics, and interactive dashboards.

Pre-requisites

- Basic knowledge of Database Management Systems.
- Basic understanding of Statistics and Spreadsheet tools.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Explain data curation concepts, data lifecycle, data quality dimensions, metadata, and governance principles.	Remember
CO2	Perform data cleaning, transformation, integration, and preprocessing using appropriate techniques.	Understand
CO3	Apply exploratory data analysis and visualization techniques to represent data effectively.	Apply
CO4	Analyze datasets using dashboards and visualization tools to derive meaningful insights.	Analyse
CO5	Evaluate modern visualization approaches, storytelling techniques, AI-assisted analytics, and ethical issues in data visualization.	Analyse

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO2	3	3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

3 - Strong; 2 - Medium; 1 – Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	20	10	10
Understand	40	10	20
Apply	-	20	40
Analyse	-	20	30
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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in Academic Council Meeting held on 13.06.2026

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Syllabus

K.S.Rangasamy College of Technology – Autonomous R2022								
B.Tech – Information Technology								
60 IT E38 - Data Curation and Visualization								
Semester	**Hours/Week**			**Total Hours**	**Credit**	**Maximum Marks**		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Data Curation Fundamentals* Introduction to Data Curation – Data Lifecycle – Types of Data – Structured, Semi-Structured and Unstructured Data – Data Quality Dimensions – Metadata and Data Catalogs – Data Governance – Data Privacy and Security – FAIR Data Principles.	[9]
Data Cleaning and Preparation* Data Collection Methods – Missing Value Handling – Duplicate Detection – Data Transformation – Data Normalization and Standardization – Data Integration – Data Reduction – Feature Engineering – Exploratory Data Analysis (EDA).	[9]
Data Visualization Techniques* Principles of Effective Visualization – Visual Encoding – Chart Selection – Bar Charts – Line Charts – Pie Charts – Scatter Plots – Histograms – Heat Maps – Geographical Maps – Infographics – Data Visualization Best Practices.	[9]
Dashboard Design and Visual Analytics ** Interactive Dashboards – KPI Visualization – Filters and Drill-down Analysis – Storytelling with Data – Tableau Fundamentals – Microsoft Power BI Fundamentals – Google Looker Studio – Business Reporting – Dashboard Design Principles.	[9]
Emerging Trends in Data Visualization ** AI-assisted Data Visualization – Automated Insights – Real-Time Data Visualization – Big Data Visualization – Visual Analytics for Decision Support – Ethics in Data Visualization – Misleading Visualizations – Case Studies – Future Trends.	[9]
Total Hours:	**45**

Text Book(s):

1. Ben Fry, **Visualizing Data**, O'Reilly Media, 2nd Edition.
2. Cole Nussbaumer Knaflic, **Storytelling with Data**, Wiley, 2nd Edition.
3. Tamara Munzner, **Visualization Analysis and Design**, CRC Press

Reference(s):

1. Andy Kirk, **Data Visualization: A Handbook for Data Driven Design**, Sage Publications.
2. Claus O. Wilke, **Fundamentals of Data Visualization**, O'Reilly Media
3. Alberto Cairo, **The Truthful Art**, New Riders.
4. Ben Jones, **Communicating Data with Tableau**, O'Reilly Media.

* SDG-4 – Quality Education

** SDG-8 – Employment and decent work for all

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Data Curation Fundamentals**	
1.1	Introduction to Data Curation	1
1.3	Data Lifecycle	1
1.4	Types of Data	1
1.5	Data Quality Dimensions	1
1.6	Metadata and Data Catalogs	1
1.7	Data Governance	1
1.8	Data Privacy and Security	1
1.9	FAIR Data Principles	2
2.0	**Data Cleaning and Preparation**	
2.1	Data Collection Methods	1
2.2	Missing Value Handling, Duplicate Detection	2
2.4	Data Transformation, Data Normalization and Standardization	2
2.6	Data Integration, Data Reduction	2
2.8	Feature Engineering	1
2.9	Exploratory Data Analysis	1
3.0	**Data Visualization Techniques**	
3.1	Principles of Effective Visualization	1
3.2	Visual Encoding	1
3.3	Chart Selection	1
3.4	Bar, Line and Pie Charts	2
3.5	Scatter Plot and Histogram	2
3.7	Heat Maps	1
3.8	Geographic Maps	1
3.9	Visualization Best Practices	1
4.0	**Dashboard Design and Visual Analytics**	
4.1	Interactive Dashboards	1
4.2	KPI Visualization	1
4.3	Filters and Drill-down Analysis	1
4.4	Storytelling with Data	1
4.5	Tableau Fundamentals	2
4.6	Microsoft Power BI Fundamentals	1
4.7	Google Looker Studio	1
4.9	Dashboard Design Principles	1
5.0	**Emerging Trends in Data Visualization**	
5.1	AI-assisted Data Visualization	1
5.2	Automated Insights	1
5.3	Real-Time Data Visualization	1
5.4	Big Data Visualization	1
5.5	Visual Analytics for Decision Support	1
5.6	Ethics in Data Visualization, Misleading Visualizations	2
5.8	Case Studies	1
5.9	Future Trends	1
	Total Hours	**45**

Course Designer(s)

1. Dr.K.Mahalakshmi - mahalakshmik@ksrct.ac.in

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60 IT E48	Predictive Analytics	Category	L	T	P	Credit
		PC	3	0	0	3

Objectives

- To understand the concepts, techniques, and applications of predictive analytics in business decision-making.
- To develop skills in data preprocessing, exploratory data analysis, and statistical modeling.
- To apply machine learning algorithms for building predictive models using real-world datasets.
- To analyze time series data and forecasting techniques for predictive decision support.
- To develop, evaluate, and deploy predictive analytics solutions using modern tools and technologies.

Pre-requisites

- Basic knowledge of programming concepts using Python.
- Familiarity with mathematics, statistics, and probability fundamentals.
- Basic understanding of databases and data handling concepts.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Understand the concepts, workflow, and applications of predictive analytics, including data preprocessing and exploratory data analysis.	Understand
CO2	Apply statistical methods and regression techniques to develop predictive models for structured datasets.	Apply
CO3	Apply machine learning algorithms to build, evaluate, and optimize predictive analytics models.	Apply
CO4	Analyze time series data, forecasting models, and model performance using appropriate evaluation metrics.	Analyse
CO5	Develop and deploy end-to-end predictive analytics solutions for real-world business problems using modern analytics tools.	Apply

Mapping with Programme Outcomes

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	-	-	2	-	-	-	1	-	1	1	1	1	-
CO2	3	3	2	2	3	1	-	-	2	-	2	1	2	3	1
CO3	3	3	3	3	3	1	-	-	2	1	2	1	2	3	2
CO4	3	3	2	3	3	1	-	-	1	1	2	1	2	2	1
CO5	3	3	3	3	3	2	-	-	2	1	2	2	3	3	3

3 - Strong; 2 - Medium; 1 - Some

Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)		End Sem Examination (Marks)
	1	2	
Remember	10	6	10
Understand	10	4	10
Apply	40	40	70
Analyse	-	10	10
Evaluate	-	-	-
Create	-	-	-
Total	60	60	100

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Syllabus

K. S. Rangasamy College of Technology – Autonomous R2022

B. Tech – Information Technology

60 IT E48 - Predictive Analytics

Semester	Hours/Week			Total Hours	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	0	0	45	3	40	60	100

Predictive Analytics Fundamentals Introduction to Predictive Analytics – Data Analytics Lifecycle – Types of Analytics (Descriptive, Diagnostic, Predictive, Prescriptive) – Business Applications of Predictive Analytics – Data Collection and Data Sources – Data Quality and Data Preprocessing – Data Cleaning – Handling Missing Values and Outliers – Data Transformation and Normalization – Feature Engineering – Introduction to Python Libraries (NumPy, Pandas, Matplotlib, Scikit-learn).	[9]
Data Exploration and Statistical Modeling Exploratory Data Analysis (EDA) – Data Visualization Techniques – Correlation Analysis – Probability Concepts – Sampling Techniques – Descriptive Statistics – Hypothesis Testing – Regression Analysis – Linear and Multiple Regression – Logistic Regression – Model Assumptions – Performance Evaluation Metrics.	[9]
Machine Learning for Predictive Analytics Introduction to Machine Learning – Supervised and Unsupervised Learning – Classification Algorithms – Decision Trees – Random Forest – Naïve Bayes – Support Vector Machine – K-Nearest Neighbors – Ensemble Learning Concepts – Cross Validation – Hyperparameter Tuning – Model Selection.	[9]
Time Series and Forecasting Models Introduction to Time Series Data – Time Series Components – Data Smoothing Techniques – Moving Average – Exponential Smoothing – ARIMA Models – Seasonal Forecasting – Forecast Accuracy Measures – Business Forecasting Applications – Demand Forecasting – Sales Prediction – Financial Forecasting.	[9]
Predictive Analytics Applications and Deployment Model Deployment Concepts – Model Monitoring and Performance Evaluation – Explainable AI (SHAP and LIME) – Predictive Analytics using Cloud Platforms – Business Intelligence Dashboards – Case Studies in Healthcare, Finance, Retail and Manufacturing – Ethical Issues in Predictive Analytics – Mini Project: End-to-End Predictive Analytics Solution Development and Deployment.	[9]
Total Hours:	**45**

Text Book(s):

1. Eric Siegel, Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die, Revised Edition, Wiley, 2016.
2. Dean Abbott, Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst, 2nd Edition, Wiley, 2022.

Reference(s):

1. Trevor Hastie, Robert Tibshirani and Jerome Friedman, The Elements of Statistical Learning, 2nd Edition, Springer, 2017.
2. Max Kuhn and Kjell Johnson, Applied Predictive Modeling, Springer, 2019.
3. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow, 3rd Edition, O'Reilly Media, 2023.

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Course Contents and Lecture Schedule

S. No.	Topics	No. of hours
1.0	**Predictive Analytics Fundamentals**	
1.1	Introduction to Predictive Analytics	1
1.2	Data Analytics Lifecycle	1
1.3	Types of Analytics (Descriptive, Diagnostic, Predictive, Prescriptive)	1
1.4	Business Applications of Predictive Analytics	1
1.5	Data Collection and Data Sources	1
1.6	Data Quality and Data Preprocessing	1
1.7	Data Cleaning – Handling Missing Values and Outliers	1
1.8	Data Transformation and Normalization	1
1.9	Feature Engineering – Introduction to Python Libraries (NumPy, Pandas, Matplotlib, Scikit-learn).	1
2.0	**Data Exploration and Statistical Modeling**	
2.1	Exploratory Data Analysis (EDA)	1
2.2	Data Visualization Techniques	1
2.3	Correlation Analysis – Probability Concepts	1
2.4	Sampling Techniques – Descriptive Statistics	1
2.5	Hypothesis Testing	1
2.6	Regression Analysis	1
2.7	Linear and Multiple Regression	1
2.8	Logistic Regression – Model Assumptions	1
2.9	Performance Evaluation Metrics.	1
3.0	**Machine Learning for Predictive Analytics**	
3.1	Introduction to Machine Learning	1
3.2	Supervised and Unsupervised Learning	1
3.3	Classification Algorithms - Decision Trees	1
3.4	Random Forest - Naïve Bayes	1
3.5	Support Vector Machine	1
3.6	K-Nearest Neighbors	1
3.7	Ensemble Learning Concepts	1
3.8	Cross Validation – Hyperparameter Tuning	1
3.9	Model Selection.	1
4.0	**Time Series and Forecasting Models**	
4.1	Introduction to Time Series Data	1
4.2	Time Series Components	1
4.3	Data Smoothing Techniques	1
4.4	Moving Average – Exponential Smoothing	1
4.5	ARIMA Models – Seasonal Forecasting	1
4.6	Forecast Accuracy Measures	1
4.7	Business Forecasting Applications	1
4.8	Demand Forecasting – Sales Prediction	1
4.9	Financial Forecasting	1
5.0	**Predictive Analytics Applications and Deployment**	
5.1	Model Deployment Concepts	1
5.2	Model Monitoring and Performance Evaluation	1
5.3	Explainable AI (SHAP and LIME)	1

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5.4	Predictive Analytics using Cloud Platforms	2
5.5	Business Intelligence Dashboards	1
5.6	Case Studies in Healthcare, Finance, Retail and Manufacturing	1
5.7	Ethical Issues in Predictive Analytics	1
5.8	End-to-End Predictive Analytics Solution Development and Deployment.	1

Course Designer(s)

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