K.S. Rangasamy College of Technology

(Autonomous)

Curriculum & Syllabus

of

B.Tech. Information Technology

(For the batch admitted in 2021 – 2025)

R 2018

Courses 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 experientiallearning
- 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 computingto 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 analyze 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.

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Year I	I	Communication Skills I	1	1.4	1	1.6	1.4	1.2	1.2	1.6	2.4	3	2.2	3
		Calculus and Differential Equations	3	3	2.8	2.4	2.4							2
		Applied Chemistry	3	3	2.8	2	2.2	2.4	2.6	2	1.7	1	1.4	2
		Engineering Mechanics	3	2	2	3								2
		Programming for Problem Solving	1	3		2.4	2.8			2				1.8
		Essence of Indian Traditional Knowledge						2.6	3					2.2
		Chemistry Laboratory	3	3	3	3	3	3	2.4	2	2		2.2	1.2
		Programming for Problem Solving Laboratory	1	3		2.4	2.8			2				1.8
	II	Communication Skills II	1	2	1	2	1	2	1	2	3	3	2	3
		Laplace Transform and Complex Variables	3	3	2.4	2.2	2.8							2
		Semiconductor Optoelectronics	3	2.8	2.8	2.8	2.8	2.4	2	2.2	2.3	2	2.8	1.5
		Basic Electrical Engineering	3	3	1.6	1.5	2	2	2	2	1.6	2	2.2	1.5
		Engineering Graphics	3	2.6	3	3	3	1	1	1		3	1.4	1.4
		Universal Human Values	3	3	2	2	2	3	3	3	3	3	2	1
		Applied Physics Laboratory	3	2.6	2.4	2.2	2	2.4	1.6	1.4	1	1.2	1.6	1.6
		Engineering Practices Laboratory	3	2	2	1	3	2	2	3	1	2	2	1
Year II	III	Probability and Statistics	3	2	3	2.4	2	3					3	2.4

		Data Structures	1	3	3	3	2.3		2			2		2
		Object Oriented Programming	2.6		3	2.4	1				1		1	
		Digital Logic Circuits	3	3	3	3	2							
		Software Engineering	2.5	2.7	2.75	3	3				3	3	2.57	
		Environmental Science	2.6	2.4	2.6	2.6	2.5	2.8	3	3	2.8	2.8	2.5	2
		Data Structures Laboratory	1	3	3	3	3		3			3		3
		Object Oriented Programming Laboratory	3		3		2	2		1				
		Career Competency Development I	1	1	1	1	1	2	1	2	3	3	2	3
	IV	Discrete Mathematics	3	3	2	3	2							2
		Design and Analysis of Algorithms	3	3	3	2.4	3							
		Java Programming	3	3	3	2	1			1				1
		Computer Organization and Architecture	3	2	3	2	1	2	2	1	1	1	1	2
		Operating Systems	3	2.6	2	2	2							
		Open Elective – I												
		Start-ups and Entrepreneurship	2.8	2.6	3	2.4	2.2	2.5	1.6	1.7	1.3	2	2.2	2.4
		National Cadet Corps(Air Wing)	3	2	1	1	3	3	3	3	3	3	3	3
		National Cadet Corps(Army Wing)						1		3				
		Java Programming Laboratory	3	3	3	2	2			1	2			1
		Operating Systems and Open Source Laboratory	3	3	3	2	2							
		Career Competency Development II	2	2	1	1	1	2	1	1	2	3	2	3
Year III	V	Computer Networks	3	2.6	2.6	2	2							
		Database Management Systems	2	2.6	2.8	2.6	3				2	2	2	2
		Programming using Python	3	3	3	2	2							2
		Elective – I												
		Open Elective – II												
		Networking Laboratory	3	3	3	3	3				2		1	1
		Database Management Systems Laboratory	2	2.6	2.8	2.6	3				2	2	2	2
		Career Competency Development III	2	1	2	2	1	1	1	1	2	3	2	3
	VI	Data Science	3	3	2	2.5	2.75		3			3	3	2.75
		Web Technology	3	1.8	1.8	2	2	2	2	2	2	2	2	2
		Machine Learning	2	3	3	3	3				2	2	2	2
		Software Testing	3	3	3	3	3							1
		Elective – II												
		Open Elective – III												
		Data Science Laboratory	3	3	3	2.4	2.8		3			3	3	3
		Design Project	3	2	2	2	2	2	2	2	3	2	1	2
		Career Competency Development IV	2	1	2	2	1	2	1	1	2	3	2	3
Year IV	VII	Engineering Economics and Financial Accounting	3	2	3	2	1	3	2	1	2	2	3	1
		Mobile Communication	3	2	1.8	2.3	2	2.5	2.3	2	1.4	1	2.5	2
		Cloud Computing	2.6	2.3	3	2	2.6	2	2	2				
		Cryptography and Network Security	2.8	3		2			2.3	2		2	2	2
		Elective – III												

		Open Elective – IV												
		Research Skill Development - I	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**3**	**2**	**1**
		Cloud Computing Laboratory	**3**	**3**	**2**	**3**								
		Project Work - Phase I	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**
		Career Competency Development V	**2**	**1**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**3**	**2**	**3**
	VIII	**Elective – IV**												
		Elective – V												
		Research Skill Development - II	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**1**	**2**	**2**	**1**
		Project Work - Phase II	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**

R2018 CURRICULUM

SEMESTER I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 EN 001	Communication Skills I	HS	2	1	1	0	2
2.	50 MA 001	Calculus and Differential Equations	BS	4	3	1	0	4
3.	50 CH 001	Applied Chemistry	BS	3	3	0	0	3
4.	50 ME 003	Engineering Mechanics	ES	4	3	1	0	4
5.	50 CS 001	Programming for Problem Solving	ES	3	3	0	0	3
6.	50 MY 006	Essence of Indian Traditional Knowledge	MC	2	2	0	0	0
PRACTICALS								
7.	50 CH 0P1	Chemistry Laboratory	BS	4	0	0	4	2
8.	50 CS 0P1	Programming for Problem Solving Laboratory	ES	4	0	0	4	2
Total				**26**	**15**	**03**	**08**	**20**

SEMESTER II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 EN 002	Communication Skills II	HS	2	1	1	0	2
2.	50 MA 002	Laplace Transform and Complex Variables	BS	4	3	1	0	4
3.	50 PH 003	Semiconductor Optoelectronics	BS	3	3	0	0	3
4.	50 EE 001	Basic Electrical Engineering	ES	3	3	0	0	3
5.	50 ME 002	Engineering Graphics	ES	6	2	0	4	4
6.	50 MY 004	Universal Human Values	MC	3	2	1	0	3
PRACTICALS								
7.	50 PH 0P2	Applied Physics Laboratory	BS	4	0	0	4	2
8.	50 ME 0P1	Engineering Practices Laboratory	ES	4	0	0	4	2
Total				**29**	**14**	**03**	**12**	**20**

***UHV extra credit is offered.**

SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 MA 005	Probability and Statistics	BS	4	3	1	0	4
2.	50 CS 002	Data Structures	PC	3	3	0	0	3
3.	50 CS 003	Object Oriented Programming	PC	3	3	0	0	3
4.	50 EC 002	Digital Logic Circuits	PC	6	3	1	2	5
5.	50 IT 301	Software Engineering	PC	5	3	0	2	4
6.	50 MY 002	Environmental Science	MC	2	2	0	0	0
PRACTICALS								

7.	50 CS 0P2	Data Structures Laboratory	PC	4	0	0	4	2
8.	50 CS 0P3	Object Oriented Programming Laboratory	PC	4	0	0	4	2
9.	50 TP 0P1	Career Competency Development I	EEC	2	0	0	2	0
Total				**33**	**17**	**02**	**14**	**23**

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	51 MA 011	Discrete Mathematics	BS	4	3	1	0	4
2.	51 IT 001	Design and Analysis of Algorithms	PC	4	2	0	2	3
3.	51 IT 401	Java Programming	PC	3	3	0	0	3
4.	50 IT 402	Computer Organization and Architecture	PC	3	3	0	0	3
5.	50 IT 403	Operating Systems	PC	3	3	0	0	3
6.	50 IT L**	Open Elective – I	OE	3	3	0	0	3
7.	50 MY 014	Start-ups and Entrepreneurship	MC	2	2	0	0	0
8.	50 GE 00*	National Cadet Corps	GE	2	1	0	1	3
PRACTICALS								
9.	52 IT 4P1	Java Programming Laboratory	PC	4	0	0	4	2
10.	51 IT 4P2	Operating Systems and Open Source Laboratory	PC	4	0	0	4	2
11.	50 TP 0P2	Career Competency Development II	EEC	2	0	0	2	0
Total				**34**	**20**	**01**	**13**	**23**

*** NCC is optional, Extra credit is offered**

SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 IT 501	Computer Networks	PC	3	3	0	0	3
2.	52 IT 502	Database Management Systems	PC	3	3	0	0	3
3.	50 IT 503	Programming using Python	PC	5	3	0	2	4
4.	50 IT E1*	Elective – I	PE	3	3	0	0	3
5.	50 IT L**	Open Elective – II	OE	3	3	0	0	3
PRACTICALS								
6.	51 IT 5P1	Networking Laboratory	PC	4	0	0	4	2
7.	52 IT 5P2	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	50 TP 0P3	Career Competency Development III	EEC	2	0	0	2	0
Total				**27**	**15**	**00**	**12**	**20**

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	51 IT 601	Data Science	PC	4	3	1	0	4
2.	51 IT 602	Web Technology	PC	3	3	0	0	3
3.	50 IT 603	Machine Learning	PC	3	3	0	0	3
4.	50 IT 604	Software Testing	PC	3	3	0	0	3
5.	50 IT E2*	Elective – II	PE	3	3	0	0	3
6.	50 IT L**	Open Elective – III	OE	3	3	0	0	3
PRACTICALS								
7.	52 IT 6P1	Data Science Laboratory	PC	4	0	0	4	2
8.	50 IT 6P2	Design Project	EEC	4	0	0	4	2
9.	50 TP 0P4	Career Competency Development IV	EEC	2	0	0	2	0
Total				**29**	**18**	**01**	**10**	**23**

SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
2.	50 IT 701	Mobile Communication	PC	3	3	0	0	3
3.	50 IT 702	Cloud Computing	PC	3	3	0	0	3
4.	50 IT 703	Cryptography and Network Security	PC	4	3	1	0	4
5.	50 IT E3*	Elective – III	PE	3	3	0	0	3
6.	50 IT L**	Open Elective – IV	OE	3	3	0	0	3
7.	50 AC 001	Research Skill Developmet – I	AC	1	1	0	0	0
PRACTICALS								
8.	50 IT 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2
9.	50 IT 7P2	Project Work - Phase I	EEC	4	0	0	4	2
10.	50 TP 0P5	Career Competency Development V	EEC	2	0	0	2	0
Total				**30**	**19**	**01**	**10**	**23**

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	50 IT E4*	Elective – IV	PE	3	3	0	0	3
2.	50 IT E5*	Elective – V	PE	3	3	0	0	3
3.	50 AC 002	Research Skill Developmet – II	AC	1	1	0	0	0
PRACTICALS								
4.	50 IT 8P1	Project Work - Phase II	EEC	16	0	0	16	8
Total				**23**	**07**	**00**	**16**	**14**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 166

Note: HS- Humanities and Social Sciences including Management Courses, BS- Basic Science Courses, ES-Engineering Science Courses, PE-Professional Core Courses, PE-Professional Elective Courses, GE- General Elective Courses,OE- Open Elective Courses, EEC-Employability Enhancement Courses, AC- Audit Courses & MC- Mandatory Courses

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 EN 001	Communication Skills I	HS	2	1	1	0	2
2.	50 EN 002	Communication Skills II	HS	2	1	1	0	2
3.	50 HS 001	Engineering Economics and Financial Accounting	HS	3	3	0	0	3

BASIC SCIENCES (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 MA 001	Calculus and Differential Equations	BS	4	3	1	0	4
2.	50 CH 001	Applied Chemistry	BS	3	3	0	0	3
3.	50 CH 0P1	Chemistry Laboratory	BS	4	0	0	4	2
4.	50 MA 002	Laplace Transform and Complex Variables	BS	4	3	1	0	4
5.	50 PH 003	Semiconductor Optoelectronics	BS	3	3	0	0	3
6.	50 PH 0P2	Applied Physics Laboratory	BS	4	0	0	4	2
7.	50 MA 005	Probability and Statistics	BS	4	3	1	0	4
8.	51 MA 011	Discrete Mathematics	BS	4	3	1	0	4

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 ME 003	Engineering Mechanics	ES	4	3	1	0	4
2.	50 EE 001	Basic Electrical Engineering	ES	3	3	0	0	3
3.	50 ME 002	Engineering Graphics	ES	6	2	0	4	4
4.	50 ME 0P1	Engineering Practices Laboratory	ES	4	0	0	4	2
5.	50 CS 001	Programming for Problem Solving	ES	3	3	0	0	3
6.	50 CS 0P1	Programming for Problem Solving Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 CS 002	Data Structures	PC	3	3	0	0	3
2.	50 CS 003	Object Oriented Programming	PC	3	3	0	0	3
3.	50 IT 301	Software Engineering	PC	5	3	0	2	4
4.	50 CS 0P2	Data Structures Laboratory	PC	4	0	0	4	2
5.	50 CS 0P3	Object Oriented Programming Laboratory	PC	4	0	0	4	2
6.	50 EC 002	Digital Logic Circuits	PC	6	3	1	2	5
7.	51 IT 001	Design and Analysis of Algorithms	PC	4	2	0	2	3
8.	51 IT 401	Java Programming	PC	3	3	0	0	3
9.	50 IT 402	Computer Organization and Architecture	PC	3	3	0	0	3
10.	50 IT 403	Operating Systems	PC	3	3	0	0	3
11.	52 IT 4P1	Java Programming Laboratory	PC	4	0	0	4	2
12.	51 IT 4P2	Operating Systems and Open Source Laboratory	PC	4	0	0	4	2
13.	50 IT 501	Computer Networks	PC	3	3	0	0	3
14.	52 IT 502	Database Management Systems	PC	3	3	0	0	3
15.	50 IT 503	Programming using Python	PC	5	3	0	2	4
16.	51 IT 5P1	Networking Laboratory	PC	4	0	0	4	2
17.	52 IT 5P2	Database Management Systems Laboratory	PC	4	0	0	4	2
18.	51 IT 601	Data Science	PC	4	3	1	0	4
19.	51 IT 602	Web Technology	PC	3	3	0	0	3
20.	50 IT 603	Machine Learning	PC	3	3	0	0	3
21.	50 IT 604	Software Testing	PC	3	3	0	0	3
22.	52 IT 6P1	Data Science Laboratory	PC	4	0	0	4	2
23.	50 IT 701	Mobile Communication	PC	3	3	0	0	3
24.	50 IT 702	Cloud Computing	PC	3	3	0	0	3
25.	50 IT 703	Cryptography and Network Security	PC	4	3	1	0	4
26.	50 IT 7P1	Cloud Computing Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SEMESTER V, ELECTIVE I

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	51 IT E11 /50 IT L13	C# and .NET Framework	PE	3	3	0	0	3
2.	50 IT E12	User Interface Design	PE	3	3	0	0	3
3.	50 IT E13	Mathematical Foundations of Data Science	PE	3	3	0	0	3
4.	51 IT E14	Computer Graphics and Multimedia	PE	4	2	0	2	3
5.	50 IT E15	Bioinformatics	PE	3	3	0	0	3
6.	50 IT E16	Compiler Design	PE	3	3	0	0	3

7.	50 IT E17	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
8.	50 IT E18	Programming in Java	PE	3	3	0	0	3

SEMESTER VI, ELECTIVE II

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 IT E21	High Performance Networks	PE	3	3	0	0	3
2.	51 IT E22	Distributed Component Architecture	PE	4	2	0	2	3
3.	50 IT E23	Distributed Computing	PE	3	3	0	0	3
4.	51 IT E24	Data Mining Techniques	PE	4	2	0	2	3
5.	50 IT E25	Database Administration	PE	3	3	0	0	3
6.	51 IT E26	Digital Image Processing	PE	4	2	0	2	3
7.	50 IT E27	Information Retrieval Techniques	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 IT E31	Wireless Sensor Networks	PE	3	3	0	0	3
2.	50 IT E32/ 50 IT L12	MERN Stack	PE	4	2	0	2	3
3.	50 IT E33	Pattern Recognition	PE	3	3	0	0	3
4.	50 IT E34 /51 IT L05	Mobile Application Development	PE	4	2	0	2	3
5.	50 IT E35	Web Mining	PE	4	2	0	2	3
6.	50 IT E36	Software Quality Management	PE	3	3	0	0	3
7.	50 IT E37	Social Network Analysis	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 IT E41 /52 IT L10	Artificial Intelligence for Industry 4.0	PE	4	2	0	2	3
2.	50 IT E42	Soft Computing and Optimization	PE	4	2	0	2	3
3.	50 IT E43	Cyber Security and Forensics	PE	4	2	0	2	3
4.	50 IT E44	Natural Language Processing and Text Analytics	PE	4	2	0	2	3
5.	50 IT E45	Big Data Framework	PE	4	2	0	2	3
6.	50 IT E46	Blockchain Technology	PE	4	2	0	2	3
7.	50 IT E47	Ontology and Semantic Web	PE	4	2	0	2	3

SEMESTER VIII, ELECTIVE V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 IT E51	Business Intelligence	PE	3	3	0	0	3
2.	50 IT E52	Big Data Analytics	PE	3	3	0	0	3
3.	50 IT E53	Deep Learning	PE	4	2	0	2	3
4.	50 IT E54	Big Data Security	PE	3	3	0	0	3
5.	50 IT E55	Ethical Hacking	PE	4	2	0	2	3
6.	50 IT E56	Ubiquitous Computing	PE	3	3	0	0	3
7.	50 IT E57	Web of Things	PE	3	3	0	0	3

GENERAL ELECTIVE (GE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 GE 001	National Cadet Corps(Air Wing)	GE	4	2	0	2	3
2.	50 GE 002	National Cadet Corps(Army Wing)	GE	4	2	0	2	3

SEMESTER VII & SEMESTER VIII, AUDIT COURSES (AC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 AC 001	Research Skill Development – I	AC	1	1	0	0	0
2.	50 AC 002	Research Skill Development – II	AC	1	1	0	0	0

MANDATORY COURSES (MC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 MY 002	Environmental Science	MC	2	2	0	0	0
2.	50 MY 004	Universal Human Values	MC	3	2	1	0	3
3.	50 MY 006	Essence of Indian Traditional Knowledge	MC	2	2	0	0	0
4.	50 MY 014	Start-ups and Entrepreneurship	MC	2	2	0	0	0

OPEN ELECTIVES I / II / III / IV (OE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50 IT L01	E-Commerce	OE	3	3	0	0	3
2.	50 IT L02	Web Design	OE	3	3	0	0	3
3.	50 IT L03	Python Programming	OE	3	3	0	0	3
4.	50 IT L04	Multimedia Technologies	OE	3	3	0	0	3
5.	50 IT E34 / 51 IT L05	Mobile Application Development	OE	4	2	0	2	3
6.	50 IT L06	Programming in Data Structures	OE	3	3	0	0	3
7.	50 IT L07	Programming in C++	OE	3	3	0	0	3
8.	50 IT E18 / 50 IT L08	Programming in Java	OE	3	3	0	0	3
9.	50 IT L09	Database Technology	OE	3	3	0	0	3
10.	50 IT E41 / 52 IT L10	Artificial Intelligence for Industry 4.0	OE	4	2	0	2	3
11.	50 IT L11	Cyber Security	OE	3	3	0	0	3
12.	50 IT E32 / 50 IT L12	MERN Stack	PE	4	2	0	2	3
13.	51 IT E11 / 50 IT L13	C# and .NET Framework	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	50TP 0P1	Career Competency Development I	EEC	2	0	0	2	0
2.	50TP 0P2	Career Competency Development II	EEC	2	0	0	2	0
3.	50TP 0P3	Career Competency Development III	EEC	2	0	0	2	0
4.	50TP 0P4	Career Competency Development IV	EEC	2	0	0	2	0
5.	50TP 0P5	Career Competency Development V	EEC	2	0	0	2	0
6.	50 IT 6P2	Design Project	EEC	4	0	0	4	2
7.	50 IT 7P2	Project Work - Phase I	EEC	4	0	0	4	2
8.	50 IT 8P1	Project Work - Phase II	EEC	16	0	0	16	8

SUMMARY

S.No.	Category	Credits Per Semester								Total Credits	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	2	2	-	-	-	-	3	-	**07**	**04.22**
2.	BS	9	9	4	4	-	-	-	-	**26**	**15.66**
3.	ES	9	9	-	-	-	-	-	-	**18**	**10.84**
4.	PC	-	-	19	16	14	15	12	-	**76**	**45.78**
5.	PE	-	-	-	-	3	3	3	6	**15**	**09.04**
6.	OE	-	-	-	3	3	3	3	-	**12**	**07.23**
7.	EEC	-	-	-	-	-	2	2	8	**12**	**07.23**
8.	MC	MC I	MC II	MC III	MC IV	-	-	-	-	**-**	**-**
9.	AC	-	-	-	-	-	-	AC I	AC II	**-**	**-**
Total		**20**	**20**	**23**	**23**	**20**	**23**	**23**	**14**	**166**	**100**

K.S.Rangasamy College of Technology – Autonomous R2018

50 EN 001 – Communication Skills I

Common to all Branches

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	1	1	0	30	2	40	60	100

Objective(s)

- 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

Course Outcomes

At the end of the course, the student will be able to

CO1: Utilize digital literacy tools to develop listening skills & make use of contextual clues to infer meanings of unfamiliar words

CO2: Able to select, compile & synthesize information using communication strategies for an effective oral presentation

CO3: Skim & Scan the textual content & infer meanings of unfamiliar words to develop reading & vocabulary skills

CO4: Generate ideas from sources to develop coherent content and support with relevant details in writing

CO5: Recognize the basic phonetic patterns of language & execute it for competent loud Reading

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Listening

Listening to Short Audios – Watching Short Videos - answering Multiple Choice Questions and Vocabulary Check- Listening to Short Comprehension Passages – Guided Listening – Listening to songs and cognizing the lyrics [7]

Speaking

Brainstorming – Group Discussion (unstructured) – Self Introduction - Just a Minute (JaM) - Short Narratives – Cue Cards – Picture Cards – Conversational Practices (Preliminary) [10]

Reading

Silent Reading – Scanning and Skimming - Reading short and Medium Passages – Cognition of Theme and Inferential Meaning - Academic and Functional Vocabulary List (350 words) – Word Power Check - Loud Reading – Modulation and Pronunciation Check [8]

Writing

Functional Vocabulary and Word Power – Data Interpretation - Paragraph Writing – Letter Writing –Email Writing –Conversational Fill Ups [5]

Total Hours 30

Text book(s):

1. M.Ashraf Rizvi, “Effective Technical Communication”, 2nd Edition, McGraw Hill Education (India) Private Limited, Chennai, 2018
2. Norman Lewis, “Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary Book”, Penguin Random House India, 2020

Rev.No.5 / w.e.f. 10/07/2023
Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Reference(s):	
1.	Paul Emmerson and Nick Hamilton, “Five Minute Activities for Business English”, Cambridge University Press, N.York, 2005.
2.	Arthur Brookes and Peter Grundy, ”Beginning to Write: Writing Activities for Elementary and Intermediate Learners”, Cambridge University Press, N.York, 2003.
3.	Michael McCarthy and Felicity O Dell , “English Vocabulary in Use: Upper Intermediate”, Cambridge University Press, N.York, 2012.
4.	https://learningenglish.britishcouncil.org/en/listening.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1		1	1	1	1	2	3	3	2	3	1	1	2
CO2	1	1		3	2	1		2	3	3	3	3	2	1	2
CO3	1	2	1	2	1	1	2	1	2	3	2	3	1		1
CO4	1	2	1	1	2	2	1	2	1	3	3	3		1	2
CO5	1	1		1	1	1	1	1	3	3	1	3			

K.S. Rangasamy College of Technology – Autonomous R2018

50 MA 001 - Calculus and Differential Equations

Common to all Branches

Semester	Hours / week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	40	60	100

Objective(s)

- To familiarize the students with the basic concepts in Cayley - Hamilton theorem and Orthogonal transformation.
- To get exposed to the fundamentals in circle of curvature, evolute and envelope of thecurves.
- To acquire skills to understand the concepts involved in Jacobians and maxima and minima.
- To solve various linear differential equations and simultaneous differential equations.
- To learn various techniques and methods in solving definite and indefinite integrals.

Course Outcomes

At the end of the course, the students will be able to

CO1: Apply Cayley - Hamilton theorem and to reduce quadratic form into canonical form

CO2: Compute the equation of the circle of curvature, evolute and envelope of thecurves.

CO3: Analyze Jacobian methods and constrained maxima and minimafunctions.

CO4: Apply various methods in differential equations to solve linear and simultaneous Differential equations.

CO5: Evaluate definite and indefinite integrals using different techniques.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Matrices

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors – Cayley-Hamilton theorem (without proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation - Nature of quadratic form [9]

Differential Calculus

Curvature – radius of curvature (Cartesian and polar co-ordinates) – Centre of curvature – Circle of curvature – Involute and evolute – envelope. [9]

Functions of Several Variables

Partial differentiation – Homogeneous functions and Euler’s theorem – Jacobians – Taylor’s series for functions of two variables – Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange’s Method of Undetermined Multipliers. [9]

Differential Equations

Linear differential equations of second and higher order with constant co-efficient - R.H.S is e^{ax} , $sinax$, $cosax$, $x^n \ \ n > 0$, $e^{ax}sin\beta x$, $e^{ax}cos\beta x$, $e^{ax}x^n$, $x^n sinax$ and $x^n cosax$ – Differential equations with variable co-efficients: Cauchy’s and Legendre’s form of linear equation– Method of variation of parameters – Simultaneous first-order linear equations with constant co-efficient. [9]

Integral Calculus

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals. [9]

Rev.No.5 / w.e.f. 10/07/2023

Passed in BoS Meeting held on 16/05/2023

Approved in Academic Council Meeting held on 03/06/2023 **BoS Chairman Signature**

	Total Hours: 45+15(Tutorial)	**60**
Text book(s):		
1.	Grewal B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, Delhi, 2014. Web site: https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html.	
2.	T. Veerarajan., "Engineering Mathematics", for Semesters I &II , Tata McGraw Hill Publishing Co., New Delhi,2010.	
Reference(s):		
1.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10thEdition, John Wiley and Sons (Asia)Limited, New Delhi, 2016.	
2.	Dr. P.N. Agrawal and Dr.D.N. Pandey," Integral Equations,calculus of variations and its applications", NPTEL online video courses.	
3.	Dr.S. K.Gupta and Dr. Sanjeev Kumar, "Matrix Analysis with Applications" and Prof Somnath Roy "Matrix Solvers" , NPTEL online video courses.	
4.	Dr. P.Kandasamy , Dr.K.Thilagavathy and Dr. K.Gunavathy , "Engineering Mathematics-II", S.Chand& Company Ltd, New Delhi.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3							2	3		
CO2	3	3	2	2	2							2	3		
CO3	3	3	3	2	2							2	3		
CO4	3	3	3	3	2							2	3		
CO5	3	3	3	2	3							2	3		

K.S. Rangasamy College of Technology – Autonomous R2018

50 CH 001 - Applied Chemistry

Common to all Branches

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

Objective(s)

- To endow with the periodic properties of elements and molecular orbitals variation of orbitals
- To assist the learners to apply the thermodynamic functions to electro chemical reactions and its application
- To help the learners to analyze the hardness of water and its removal techniques
- To endow with various spectroscopy techniques and its applications
- To facilitate the students with the basics of stereochemistry and types of chemical reactions with their mechanism

Course Outcomes

At the end of the course, the student will be able to

CO1: Rationalize the periodic properties of elements and molecular orbitals variation of orbitals

CO2:Apply the thermodynamic functions to electro chemical reactions and its application

CO3:Analyze the cause and effects of hardness of water and its removal techniques

CO4:Interpret the various spectroscopy techniques and its applications

CO5:Infer the types of stereochemistry and chemical reactions with their mechanism

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Periodic Properties

Effective nuclear charge - atomic and ionic sizes - ionization energies - electron affinity - electronegativity - polarizability - oxidation states - penetration of orbitals- variations of s, p, d and f orbital energies of atoms - electronic configurations, ionic, dipolar and Vander- waals interactions. Hard soft acids and bases (HSAB). Molecular orbitals of diatomic molecules - plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbital of butadiene and benzene. [9]

Chemical Equilibria and Corrosion

Thermodynamic functions - energy - entropy - enthalpy- free energy - Gibbs-Helmholtz equation **-** Van 't Hoff isotherm. Cell potentials - Nernst equation - applications - EMF series - applications - Poteniometric and Conductometric titrations. Corrosion- types of corrosion - chemical and electrochemical corrosion - mechanism - Factors influencing corrosion - Corrosion control methods (impressed current and sacrificial anode methods) - Corrosion inhibitors. [9]

Water Chemistry

Sources - Water quality parameters - impurities in water and their effects. Hardness - Estimation of hardness - effect of hard water in various industries-Softening of water- zeolite process- ion-exchange process - reverse osmosis - electrodialysis. Boiler troubles - methods of prevention. [9]

Analytical Techniques and Applications [9]

Absorption laws - Ultra violet spectroscopy (UV) - Principle - Instrumentation (Block diagram) - applications. Infra red spectroscopy (IR)- Instrumentation (Block diagram) - selection rule - types of fundamental vibrations - applications. Nuclear magnetic resonance spectroscopy (NMR) - Principle - selection rule - Instrumentation (Block diagram) - chemical shift - factors influencing the chemical shift -applications. Atomic absorption spectroscopy (AAS) - Principle - Instrumentation (Block diagram) -applications.

Concepts in Organic Chemistry

Structural isomerism- types - Stereoisomerism - geometrical (Maleic and Fumaric acids) - optical isomerism (Lactic and Tartaric acids) - symmetry - chirality- enantiomers - diastereomers - optical activity - absolute configurations.Introduction to reactions - substitution - addition - oxidation - reduction - cyclization and ring openings - mechanism. [9]

Total Hours 45

Text book(s):

1.	Jain. P.C. and Monica Jain, "Engineering Chemistry", Dhanpatrai Publishing Co. New Delhi, 14th edition, 2015.
2.	Dr. S.Vairamand Dr. Suba Ramesh, "Engineering Chemistry", Wiley India Private Limited , 2nd edition, January 2013.

Reference(s) :

1.	Puri B. R., Sharma L.R., and Pathania M.S., "Principles of Physical Chemistry", Vishal Publishing Company, Delhi, 2017.
2.	Dara. S.S, "A Text Book of Engineering Chemistry", S Chand & co. Ltd., 2014.
3.	Bahl B.S. and ArunBahl, "Advanced Organic Chemistry", S.Chand, New Delhi, 2014
4.	Sharma BK,"Instrumental methods of chemical analysis", Goel Publishing House Meerut, 23thedition; 2014.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	2	2		1	1	2			1
CO2	3	3	3	2	2	2	3	2	1	1	1	1	1	1	1
CO3	3	3	3	3	2	3	3	3	3	1	2	3	2	2	2
CO4	3	3	3	3	3	3	3	1	2	1	2	3	1	1	1
CO5	3	3	3	3	2	2	2	2	1	1	1	1			1

K. S. Rangasamy College of Technology – Autonomous R2018

50 ME 003 – Engineering Mechanics

Common to all Branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	3	1	0	60	4	40	60	100

Objective(s)

- To learn a process for analysis of static objects, concepts of force, moment, and mechanical equilibrium in two and three dimensions.
- To learn the equilibrium of rigid bodies such as frames, trusses, beams.
- To identify the properties of surfaces and solids by using different theorem.
- To impart basic concept of dynamics of particles.
- To understand the concept of friction and elements of rigid body dynamics.

Course Outcomes

At the end of the course, the student will be able to

CO1: Use scalar and vector analytical techniques for analysing forces in statically determinate structures.
CO2: Apply basic knowledge of scientific concepts to solve real-world problems.
CO3: Compute the properties of surfaces and solids using various theorems.
CO4: Analyse and solve problems on kinematics and kinetics.
CO5: Draw ashear force and bending moment diagrams, analysis of rigid body dynamics and calculation of frictional forces on contact surfaces.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Basics and Statics of Particles

Introduction -Units and Dimensions-Laws of Mechanics–Principle of transmissibility-Lame's theorem, Parallelogram and triangular Law of forces–Vectors–Vectorial representation of forces and moments.

Vector Operations [12]

Addition, subtraction, dot product, cross product-Coplanar Forces–Resolution and Composition of forces–Equilibrium of a particle–Forces in space-Equilibrium of a particle in space-Equivalent systems of forces-Single equivalent force.

Equilibrium of Rigid Bodies [12]

Free body diagram–Types of supports and their reactions–requirements of stable equilibrium–Static determinacy, Moments and Couples–Moment of a force about a point and about an axis–Vectorial representation of moments and couples–Varignon'stheorem-Equilibrium of Rigid bodies in two dimensions.

Trusses: Introduction, axial members, calculation of forces on truss members using method of joints-Method of sections.

Properties of Surfaces and Solids

Determination of Areas and Volumes-Centroid, Moment of Inertia of plane area (Rectangle, circle, triangle using Integration Method; T section, I section, Angle section, Hollow section using standard formula) - Parallel axis theorem and perpendicular axis theorem- Polar moment of inertia -Mass moment of inertia of thin rectangular section -Relation between area moment of inertia and mass moment of inertia. [12]

Dynamics of Particles

Displacement, Velocity, acceleration and their relationship–Relative motion -Projectile motion in horizontal plane– Newton's law–Work Energy Equation – Impulse and Momentum. [12]

Elements of Rigid Body Dynamics, Friction and Beams

Translation and Rotation of Rigid Bodies: Velocity and acceleration–General Plane motion: Crank and Connecting rod mechanism.

Friction

Frictional force–Laws of Coloumb friction–Simple contact friction–Ladder friction-Rolling resistance–Ratio of tension in belt. [12]

Transverse Bending on Beams

Types of beams: Supports and loads – Shear force and bending moment in beams – Cantilever, simply supported and overhanging beams.

	Total Hours	**60**

Text Book(s):

1.	Rajasekaran, S., Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt. Ltd., 3rd Edition, 2017.
2.	Beer, F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", Statics and Dynamics, McGraw-Hill International, 11th Edition, 2016.

Reference(s):

1.	Jayakumar, V. and Kumar, M, "Engineering Mechanics", PHI Learning Private Ltd, New Delhi, 2012
2.	Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd.,
3.	Bansal R.K," Engineering Mechanics" Laxmi Publications (P) Ltd, 2011.
4.	Irving H. Shames, Engineering Mechanics: Statics and Dynamics", Pearson Education Asia Pvt. Ltd, 4thEdition, 2003.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3								2	3	1	1
CO2	3	2	2	3								2	3	1	1
CO3	3	2	2	3								2	3	1	2
CO4	3	2	2	3								2	3	1	2
CO5	3	2	2	3								2	3	1	2

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50 CS 001 - Programming for Problem Solving

Common to all Branches

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

Objective(s)	• To learn the evolution of computers and examines the most fundamental element of the C language • To examine the execution of branching, looping statements, arrays 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
Course Outcomes	**At the end of the course, the student will be able to:** CO1: Infer the evolution, generation, representation of problem and recognize the concepts of data types and expressions CO2: Annotate the concept of console Input and output features and examine the execution of branching, looping statements, arrays and strings CO3: Recognize the concepts of functions, recursion, storage class specifies and pointers with its features CO4: Comprehend basic concepts of structures ,unions ,user defined data types and

	preprocessor CO5: Interpret the file concepts using proper standard library functions

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Computer and Programming

Introduction to Computers - Evolution of computers - Generations of computers and Programming Languages– Introduction to components of a computer system -Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart–Pseudocode with examples. From algorithms to programs– variables (with data types)– Type Qualifiers - Constants – Operators –expressions and precedence [9]

I/O, Branching ,Loops and Arrays

Console I/O– Unformatted and Formatted Console I/O – Conditional Branching and Loops -Writing and evaluation of conditionals and consequent branching -Iteration and loops - Arrays (1-D, 2-D), Character arrays and Strings [9]

Functions and Pointers

Functions: Scope of a Function – Library Functions and User defined functions - Function Prototypes – Function Categorization - Function Arguments - Arguments to main function - The return Statement - Recursion - 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– Dynamic memory allocation [9]

Structures, Unions, Enumerations, Typedef and Preprocessors

Structures - Arrays of Structures- Arrays and Structures within Structures - Passing Structures to Functions - Structure Pointers - Unions – BitFields - Enumerations - typedef – The preprocessor and comments. [9]

File

File: Streams –Reading and Writing Characters - Reading and Writing Strings -,File System functions - Random Access Files [9]

Total Hours 45

Text book:

1	Herbert Schildt, “The Complete Reference C”, 4th Edition, Tata McGraw Hill Edition, 2010.
2	Byron Gottfried, “Programming with C”, Third Edition, McGraw Hill Education, 2014.

Reference(s):

1	E.Balagurusamy, “Programming in ANSI C”, 7th Edition, Tata McGraw Hill Edition, New Delhi, 2016.
2	Brian W. Kernighan and Dennis M. Ritchie, “C Programming Language”, Prentice-Hall.
3	ReemaThareja, “Computer Fundamentals and Programming in C”, 2nd Edition, Oxford Higher Education, 2016.
4	K N King, “C Programming: A Modern Approach”, 2nd Edition, W.W.Norton, New York, 2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3		2	2							1			
CO2	1	3		3	3			2				2	3	3	
CO3	1	3		2	3			2				2	2	2	
CO4	1	3		3	3			2				2	3	3	
CO5	1	3		2	3			2				2	3	2	

K.S.Rangasamy College of Technology – Autonomous R2018							
50 MY 006 – Essence of Indian Traditional Knowledge							
Common to all Branches							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
I	2	0	0	30	0	100	-	100
Objective(s)	• To imparting basic principles of thought process, reasoning and inferencing. • To gain knowledge on sustainability is at the core of Indian Traditional knowledgeSystems connecting society and nature. • To inculcate holistic life style of yogic science and wisdom capsulesin • To know sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. • To gain the knowledge on Indian artistic and its tradition						

Course Outcomes	**At the end of the course, the student will be able to** CO1: Know many festivals have religious origins and entwine cultural and religious significance in traditional activities CO2: Know harvest festivals, celebrate seasonal change CO3: Ability to do case studies on philosophical tradition CO4: Perform Indian artitstic works CO5: Ability to conduct exhibition and advertisement about artistic

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Basic structure of Indian Knowledge System	[6]
Modern Science and Indian Knowledge System	[6]
Yoga and Holistic Healthcare	[6]
Case studies, Philosophical Tradition	[6]
Indian Linguistic Tradition (Phonology, morphology, syntax and semantics), Indian Artistic Tradition	[6]
Total Hours	**30**

Text book(s):

1.	V.Sivaramakrishnan(Ed.),"Cultural Heritage of India Course material", BharatiyaVidyaBhavan, Mumbai, 5th Edition,2014.
2.	G N Jha (Eng. Trans.), Ed. RN Jha, "Yoga-darshanamwithVyasaBhashya", dyanidhiPrakashan, Delhi, 2016.

Reference(s):

1.	RN Jha, "Science of Consciousness Psychotherapy and Yoga Practices", VidyanidhiPrakashan, Delhi, 2016
2.	Sengupta, Nirmal, "Traditional Knowledge in Modern India Preservation, Promotion, Ethical Access and Benefit Sharing Mechanisms", Springer, 2014.
3.	Kapil Kapoor, "Knowledge Traditions and Practices of India", Ancient Scientific Publishing, 2015
4.	Kapoor Kapil, "Indian Knowledge Systems: Vol. 2", Ancient Scientific Publishing, 2017

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						**3**						**2**			
CO2						**3**						**2**			
CO3						**2**						**2**			
CO4							**3**					**3**			
CO5							**3**					**2**			

K.S. Rangasamy College of Technology - Autonomous R2018

50 CH 0P1 - Chemistry Laboratory

Common to all Branches

Semester	Hours / Week			Total hrs	Credit	Maximum marks		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

Objective(s)	• To test the knowledge of theoretical concepts. • To develop the experimental skills of the learners. • To facilitate data interpretation. • To enable the learners to get hands-on experience on the principles discussed in theory sessions. • To expose the learners to various industrial and environmental applications.
Course Outcomes	**At the end of the course, the student will be able to** CO1: Calculate the amount of hardness, alkalinity, chloride ion and dissolved oxygen in water sample CO2: Estimate the amount of barium chloride and mixture of acids by conductometry CO3: Infer the amount of acid by pH metry and ferrous ion by potentiometry CO4: Examine the amount of ferrous ion by spectrophotometry CO5: Determine the percentage of corrosion by weight loss method

List of Experiments

	1. Estimation of hardness of water by EDTA method. 2. Estimation of alkalinity of water sample. 3. Estimation of chloride content in water sample (Argentometric method). 4. Determination of dissolved oxygen in boiler feed water (Winkler's method). 5. Estimation of barium chloride by conductometric precipitation titration. 6. Estimation of mixture of acids by conductometric titration. 7. Estimation of ferrous ion by potentiometric titration. 8. Estimation of HCl, beverages and other biological samples by pH meter. 9. Estimation of iron content by spectrophotometry method. 10. Determination of corrosion rate and inhibitor efficiency by weight loss method.
Lab Manual:	
1.	Dr. S.VairamandDr. Suba Ramesh, "Engineering Chemistry", Wiley India Private Limited , Delhi, 2nd edition, January 2013.
2.	S.S. Dara, "A Text Book on Experiments and Calculations Engineering", S.Chand& Co., Ltd., 2nd edition, 2003
Reference(s):	
1.	Mendham. J, Denney. R.C, Barnes. J.D, and Thomas. N.J.K, "Vogel's Text Book of Quantitative Chemical Analysis", Pearson Education, 6th edition, 2009.
2.	O P Vermani , and A K Narula, "Applied Chemistry : Theory And Practice, New Age International (P) Ltd., Publishers, 2nd edition, January 2020
3.	Gary D. Christian, "Analytical Chemistry", John Wiley & Sons, 6th edition, 2007.
4.	Chatwal Anand, "Instrumental Methods of Chemical Analysis", Himalaya Publications, 5th Edition,2019.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	2		3	2	1	1	1
CO2	3	3	3	3	3	3	2	3	1		2	1			1
CO3	3	3	3	3	3	3	3	2	3		2	1	1	1	1
CO4	3	3	3	3	3	3	2	1			2		2	2	2
CO5	3	3	3	3	3	3	2	1			2	1	1	1	2

K.S.Rangasamy College of Technology - Autonomous R2018

50 CS 0P1 - Programming for Problem Solving Laboratory

Common to all Branches

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
I	0	0	4	60	2	60	40	100

Objective(s)	• 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
Course Outcomes	**At the end of the course, the students will be able to** CO1: Apply how to read, display basic information and use selection and iterative statements CO2: Demonstrate C program to manage collection of related data CO3: Design and Implement different ways of passing arguments to functions, Recursion and implement pointers concepts CO4: Develop a C program to manage collection of different data using structures, Union, user-defined data types and preprocessor directives CO5: Demonstrate C pro gram to store and retrieve data using file concepts

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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3		2	2							1			
CO2	1	3		3	3			2				2	3		
CO3	1	3		2	3			2				2		1	
CO4	1	3		3	3			2				2	2		
CO5	1	3		2	3			2				2		1	

K.S.Rangasamy College of Technology – Autonomous R2018

50 EN 002 – Communication Skills II

Common to all Branches

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	1	1	0	30	2	40	60	100

Objective(s)

- 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

Course Outcomes

At the end of the course, the students will be able to

CO1: Identify speaker's purpose and tone, comprehend relationship between ideas and respond to the listening content

CO2: Use communication strategies, vocabulary and appropriate grammatical structures for effective oral interactions

CO3: Make inferences and predictions, develop reading speed, build academic vocabulary by utilizing digital literacy tools on textual comprehension

CO4: Use a variety of accurate sentence structures with functional vocabulary, apply the conventions of academic writing and use peer and teacher feedback for effectivewriting.

CO5: Demonstrate proficiency in communication skills in academic and professional Contexts

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Advanced English Listening Module

Extended Listening to Podcasts – Listen and Watch Video Clips - answering Inferential Multiple Choice Questions and Vocabulary Check- Listening to Lengthy Discourses – Structured Listening – Listening to Songs and Cognizing the Lyrics-Listening to popular speeches, news briefs and stories [10]

Oral Communication

Debates – Group Discussion (Structured) and rotate roles – Elevator Speech – Prepared Talk – Extempore – Brief Technical presentations- Spin-a-Yarn – Short Film reviews – talk on silent videos – Dialogues and Role plays (Intermediate & Higher Level) – Interviews [8]

Critical Reading Process Silent Reading – Scanning and Skimming - Reading comprehension with logical reasoning questions – Cognition of Theme and Inferential Meaning – advanced Academic and Functional Vocabulary List (1000 words) – word webs and semantic threads - Loud Reading – Modulation and Pronunciation Check – Mind maps – Note making – Deep Reading Skills	[7]
Academic Writing Practices Sentence Equivalence and Text completion tasks – Data Interpretation - Essay Writing – Letter Writing – Business Emails – Conversational Fill Ups-Rewordify (select a text and simplify/enhance the language)- Reports on events	[5]
Total Hours	**30**

Text book(s):	
1.	M.Ashraf Rizvi, “Effective Technical Communication”, 2nd Edition, McGraw Hill Education (India) Private Limited, Chennai, 2018
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, N.York, 2005
2.	Ruth Wainry b, “Stories: Narrative Activities for The Language Classroom”, Cambridge University Press, N.York, 2005
3.	Stuart Redman, “English Vocabulary in Use: Upper Intermediate”, Cambridge University Press, N.Y, 2006
4.	https://www.khanacademy.org/test-prep/sat/sat-reading-writing-practice

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2		2	1	1	1	2	3	3	2	3	1	1	1
CO2	1	2	1	3	2	1		2	3	3	2	3	1	1	2
CO3	1	2	1	2	1	1	2	2	2	3	2	3	1	1	2
CO4	1	3	1	2	2	2	1	2	2	3	3	3	1		2
CO5	1	1	1	1	1	1	1	1	3	3	2	3	1	1	2

K.S. Rangasamy College of Technology – Autonomous R2018

50 MA 002 - Laplace Transform and Complex Variables

Common to all Branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	3	1	0	60	4	40	60	100

Objective(s)

- To provide exposure and ability in handling situations involving multiple integrals, Beta and Gamma functions.
- To familiarize the students with the basic concepts in Vector calculus.
- To get exposed to the fundamentals in analytic functions, conformal mappings and Bilinear transformation.
- To acquire skills to understand the concepts involved in Cauchy’s integral formula, Cauchy’s residue theorem and Contour integration.
- To understand the concepts in Laplace transform techniques and its properties.

Course Outcomes

At the end of the course, the students will be able to

CO1: Evaluate double and tripleintegrals and analyze Beta and Gamma functions.
CO2: Analyze the basic concepts of vector calculus to verify Green’s, Stoke’s and Gauss Divergence theorems.
CO3: Construct the analytic functions and Bilinear transformation.
CO4: Apply Cauchy’s integral formula and Cauchy’s residue theorem to evaluate the complex integrals.
CO5: Apply Laplace transform techniques for solving differential equations.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Multiple Integrals

Double integration – Cartesian and polar coordinates – Change of order of integration – Area between two curves – Area as double integral – Triple integration in Cartesian coordinates. [9]

Beta and Gamma functions**:** Relationship between Beta and Gamma functions – Properties – Problems.

Vector Calculus [9]

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 - Green's theorem in the plane - Gauss divergence theorem -Stokes' theorem(without proof)- verification of the above theorems and evaluation of integrals using them

Analytic Functions

Analytic functions – Necessary conditions (Cauchy–Riemann equations)- Polar form of Cauchy–Riemann equations – Sufficient conditions (without proof) – Properties of analytic functions – Harmonic function – Harmonic conjugate – Construction of analytic functions– Conformal mapping: w = z + a, az, 1/z -Bilinear transformation. [9]

Complex Integration

Cauchy's Integral theorem (without proof) – Cauchy's integral formula – Taylor's and Laurent's series (without proof) – Classification of singularities – Cauchy's residue theorem – Contour integration – Circular and semi-circular contours (excluding poles on real axis). [9]

Laplace Transforms

Conditions for existence – Transform of elementary functions – Basic properties – Shifting theorems- Derivatives and integrals of transforms –– Transform of unit step function – Dirac's delta function- Initial and final value theorem– Transform of periodic functions. Inverse Laplace transform – Convolution theorem(excluding proof) – Solution of second order ordinary differential equation with constant co-efficients – simultaneous equations of first order with constant co-efficients. [9]

Total Hours: 45+15(Tutorial) 60

Text book(s):

1. Grewal B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, Delhi, 2014. Website:https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html.
2. Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.

Reference(s) :

1. N. P. Bali and Dr.ManishGoyal, "A text book of Engineering Mathematics",8thEdition, Laxmi Publications (P)LTD,2011
2. T Veerarajan, "Engineering Mathematics", for Semesters I and II , Tata McGraw Hill Publishing Co., New Delhi., 2010.
3. Dr P Kandasamy , Dr K Thilagavathy and Dr K Gunavathy , "Engineering Mathematics -II", S.Chand& Company Ltd, New Delhi.
4. SWAYAM online video courses.(www.swayamprabha.go/v.in).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3							2	3		
CO2	3	3	2	2	3							2	3		
CO3	3	3	3	2	2							2	3		
CO4	3	3	2	2	3							2	3		
CO5	3	3	2	3	3							2	3		

K.S.Rangasamy College of Technology – Autonomous R2018

50 PH 003 - Semiconductor Optoelectronics

Common to CS,IT

Semester	Hours/week			Total Hrs	Credit	Maximum marks		
	L	T	P		C	CA	ES	Total
II	3	0	0	45	3	40	60	100

Objective(s)

- To enhance students' knowledge of theoretical and modern technological aspects in semiconductor physics.
- To enable the students to correlate the theoretical principles with application oriented studies in optoelectronic materials.
- To explain the principles of laser, types of laser and demonstrate the applications of laser
- To state the principle of optical fiber and to understand the design and applications of optical fibers.
- To introduce advanced materials and nano technology for various engineering applications

Course Outcomes

At the end of the course, the students will be able to

CO1: Analyze the basic ideas of semiconductors and devices
CO2: Apply the principles of LCD, photodetectors and optoelectronic devices
CO3: Outline the basic ideas about classification of laser and various applications of laser.
CO4: Elaborate the propagation of light in fiber optic cables, communication link and applications
CO5: Gain broad view on advanced materials, nano technology and their engineering Applications

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Semiconductor Physics

Introduction-Elemental and compound semiconductors-Intrinsic and extrinsic semiconductors-Properties-carrier concentration in intrinsic and extrinsic semiconductors (qualitative)-p-n junction diode: characteristics-p-n junction transistors: characteristics (CB and CE)-Bipolar characteristics (Biased and unbiased)-FET: characteristics and applications. [10]

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 – Optoelectriceffect-Electro-Optic Modulation. [9]

Laser Technology

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion-different types of lasers: gas lasers (CO_2), solid-state lasers (Nd: YAG), dye lasers, Semiconductor laser (Homojunction and Hetero junction)-Properties of laser beams-applications of lasers in science and engineering. [8]

Fiber Optics and Sensors

Principles – cone of acceptance, numerical aperture (derivation)- Modes of propagation –Fabrication of optical fibre: Crucible-crucible technique - Classification: based on materials, modes and refractive index profile– Splicing : types of splicing- Losses in optical fiber – Detectors – Fiber optical communication links (Block diagram) – Advantage of fiber optical cable over copper cables- Fiber optic sensors: liquid level sensors, Temperature and Displacement sensors. [9]

Advanced Materials and Nanotechnology

New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications – advantages and disadvantages of SMA

Nano Materials: Nanomaterials: Properties- Top-down process: Ball Milling method – Bottom-up process: Vapour Phase Deposition method- Carbon Nano Tube (CNT): Properties, preparation by electric arc method, Applications [9]

Total Hours 45

Text Book(s):

1.	Rajendran V, "Engineering Physics", Tata McGraw Hill, New Delhi, 2011
2.	Arumugam M, "Engineering Physics-II", 6th Anuradha Publications, Kumbakonam, 2010.

Reference (s) :

1.	Malvino, "Electronic Principle", 6th edition, Tata McGraw Hill, New Delhi, 1999.
2.	P.K.Palanisamy "Physics of Materials", Scitech Publications,Chennai-2012.
3.	MehthaV.K. "Principles of Electronics", s.chand& co. Ltd New Delhi edition : IV year :1993
4.	Raghavan V, "Materials and Engineering", Prentice-Hall of India, New Delhi, 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	2	2	2		2	3	2	2	2	
CO2	3	2	3	3	2	2	2	2	2	2	3		2	2	2
CO3	3	3	3	3	3	2	2	2		3	3	1	3	2	
CO4	3	3	3	3	3	3	2	2	2	3	2	2	3	2	1
CO5	3	3	3	3	3	3	2	3	3	3	3	1	2	2	

K.S.Rangasamy College of Technology - Autonomous R2018

50 EE 001 - Basic Electrical Engineering

Common to all branches

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

Objective(s)

- To familiarize the basic DC and AC networks used in electrical circuits.
- To explain the concepts of electrical machines and their characteristics.
- To explore the sources of electric power generation and various types of power plant.
- To identify the various components of low voltage electrical installation

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Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

	• To describe various energy conservation methods useful in industry and commercial purpose.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Apply the basic laws of electric circuits to calculate the unknown quantities. CO2: Acquire knowledge about the constructional details and principle of operation of DC machines and AC machines CO3: Impart the knowledge of generation of electricity based on conventional and non-conventional energy sources CO4: Recognize the significance of various components of low voltage electrical installations. CO5: Create awareness of energy conservation and electrical safety

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

DC and AC Circuits

Electrical circuit elements (R, L and C), Voltage and current sources - Kirchhoff's current and voltage laws - Serial and parallel circuits - Analysis of simple circuits with DC excitation. Representation of sinusoidal waveforms, Peak and RMS values, Phasor representation, Real power, Reactive power, Apparent power, Power factor. Analysis of single phase AC circuits consisting of R, L, C, RL, RC, RLC combinations. [12]

DC&AC Machines

Construction, Types and Operation-Faraday's laws of electromagnetic induction - Transformers: Construction, Working principle, Types, Losses in transformers, Regulation, Efficiency and applications-Simple Problems - Applications [14]

Generation of rotating magnetic fields - Three phase induction motor: Construction, working principle, Characteristics, Starting - Single phase induction motor: Construction, working principle and applications - Synchronous generators: Construction, Working principle and applications

Electrical Power Generation Systems

Sources of electrical energy: Renewable and non-renewable - Principles and schematic diagram of Hydroelectric power plant, Thermal power plant, Nuclear power plant, Solar PV system and Wind energy conversion systems [5]

Electrical Installations and House Wiring

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB - Types of Batteries, Important Characteristics for Batteries - UPS.

Single phase and three phase systems: Three phase balanced circuits, Phase sequence, voltage and current relations in star and delta connections - Basic house wiring tools and components - Domestic wiring: Service mains, meter board, distribution board, energy meter. Different types of wiring: staircase, fluorescent lamp and ceiling fan [8]

Electrical Energy Conservation & Safety

Elementary calculations for energy consumption - BEE Standards - Electrical energy conservation - Methods. Electric shock, Precautions against shock, Objectives of earthing, Types of earthing - Basic electrical safety measures at home and industry [6]

Total Hours 45

Text book(s):

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2017.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2017.

Reference(s):

1. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2016.
3. V. D.Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 2015.
4. Vincent Del Toro, Electrical Engineering Fundamentals Prentice Hall, 2006.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			2					2	3		3	2	
CO2	3	3	1	1			2		2		2	1	3	2	
CO3	3	3	2	2			2	2	1			1	3	3	
CO4	3	3		2		2					2	2	3	2	
CO5	3	3	2	1	2	2			2		2	2	3	2	

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BoS Chairman Signature

50 ME 002 – Engineering Graphics								
Common to EE, EC, EI, CS, IT, BT, NST,FT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	2	0	4	90	4	50	50	100

Objective(s)	• To learn Computer Aided Drawing skills to enable graphical communication. • To learn drawing formats and conversion of pictorial views into orthographic views. • To emphasize skills to project simple solids and sectional views. • To impart the knowledge on use of drafting software to draw the isometric projection. • To acquire graphical skills to illustrate design project.
Course Outcomes	**At the end of the course, the student will be able to** CO1: Demonstrate the Impact of computer technologies on graphical communication CO2: Convert the pictorial views in to orthographic views using drafting software CO3: Draw the projection of simple solids and true shape of sections CO4: Construct the isometric projections of objects using drafting software CO5: Interpret a design project illustrating engineering graphical skills

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Computer Aided Drafting (CAD) Software

Theory of CAD software – Menu System, Toolbars (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 as used in CAD – 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). [6+12]

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.

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 and as 3D wire-frame and shaded solids – Geometric dimensioning and Tolerancing– 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, 2014.
2. Venugopal K., “Engineering Graphics”, New Age International (P) Limited, 2014.

Reference(s):

1. Shah M.B., Rana B.C., and V.K.Jadon., “Engineering Drawing”, Pearson Education, 2011.
2. Natarajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2014.
3. Agrawal B. & Agrawal C. M., “Engineering Graphics”, TMH Publication, 2012.
4. Narayana, K.L. & P Kannaiah, “Text book on Engineering Drawing”, Scitech Publishers, 2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	1	1	1		3	2	2	1	3	
CO2	3	3	3	3	3	1		1		3	1	1	1	3	
CO3	3	3	3	3	3	1		1		3	1	1	1	3	
CO4	3	3	3	3	3	1		1		3	1	1	1	3	

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CO5	3	2	3	3	3	1	1	1		3	2	2	1	3	

K.S.Rangasamy College of Technology – Autonomous R2018								
50 MY 004 - Universal Human Values								
Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	2	1	0	45	3	40	60	100
Objective(s)	• To identify the essential complementarily between 'values' and 'skills' • To ensure core aspirations of all human beings. • To achieve holistic perspective towards life and profession • To acquire ethical human conduct, trustful and mutually fulfilling human behaviour • To enrich interaction with Nature.							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Become more aware of themselves, and their surroundings CO2: Responsible in life, and in handling problems with sustainable solutions CO3: Maintain human relationships and human nature CO4: Committed towards human values, human relationship and human society CO5: Improve critical ability and apply it day-to-day life							
Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**								
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								[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, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1							
2.	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2							
Reference(s)								
1.	JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.							
2.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.							

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	2	2	3	3	3	2	3	3	1			
CO2	3	3	3	2		3	3	3	2	3	2	1			
CO3	3	3	2			3	3	3	3	3	2	1			

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CO4	3	3	3			3	3	3	3	3	2	2			
CO5	3	3	1			3	3	3	3	3	2	2			

K.S.Rangasamy College of Technology – Autonomous R2018							
50 PH 0P2 - Applied Physics Laboratory							
Common to EC, EE, EI, CS, IT,AD							
Semester	Hours/week			Total hrs	Credit	Maximum marks	
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100
Objective(s)	• 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 introduce different experiments to test basic understanding of physics concepts applied in optics and electronics. • To enable the students to correlate the theoretical principles with application oriented studies. • To analyze the behavior and characteristics of various materials for its optimum utilization						
Course Outcomes	**At the end of the course, thestudents will able to** CO1: Analyze the wavelength of laser and the particle size by diffraction phenomenon.(1) CO2: Apply the knowledge of interference to produce Newton rings and air wedge.(2-3) CO3: Extend the knowledge of diffraction property of light through grating and fiber optic cable (4,6) CO4: Infer the concept of refractive index and dispersion of light by a prism(5) CO5: Interpret the knowledge of semiconductor band gap, Hall coefficient, photovoltaic effect, Zener diode characteristics for its potential applications(7-10)						
LIST OF EXPERIMENTS							
1. Determination of wavelength of laser and particle size – diffraction. 2. Determination of radius of a plano convex lens – Newton's ring. 3. Determination of a thickness of thin wire – Air wedge method. 4. Determination of wavelength of mercury spectral lines – spectrometer grating. 5. Determination of dispersive power of a prism. 6. Determination of numerical aperture (NA) & acceptance angle of an optical fiber 7. Determination of band gap of a semiconductor PN junction diode. 8. V-I characteristics of solar cell. 9. Characteristics of Zener diode. 10. Determination of Hall coefficient of a given semiconductor and its charge carrier density							
Lab Manual:							
1.	'Physics Lab Manual', Department of Physics, KSRCT.						

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	2	2	2	2	1	2	1	1	3	3	1
CO2	3	2	3	2	2	3	2	1	1	1			3	2	
CO3	3	2	3	2	2	3	2	1	1	1		2	2	2	1
CO4	3	3	2	2	2	2	1	1			2		2	2	
CO5	3	3	2	2	2	2	1	2	1	1	2	2	3	1	

K. S. Rangasamy College of Technology – AutonomousR2018
50 ME 0P1 – Engineering Practices Laboratory
Common to all Branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
II	0	0	4	60	2	60	40	100

Objective(s)	• To acquire skills in basic engineering practices. • To identify the hand tools and instruments. • To provide hands on experience in Fitting, Carpentry, Sheet metal, Welding and lathe shop. • To provide practical training on house hold wiring and electronic circuits. • To offer real time activity on plumbing connections in domestic applications.
Course Outcomes	**At the end of the course, the student will be able to** CO1: Perform facing, plain turning, drilling. CO2: Make a model of fitting and carpentry: Square, Dovetail and Cross lap joints. CO3: Fabricate the models of sheet metal and welding joints. CO4: Construct and demonstrate electrical and electronic wiring circuit. CO5: Construct the water pipe line in plumbing shop.

Machine Shop
Safety aspects in machine shop, Study of Lathe and Radial drilling machine, Turning, Facing and Drilling.
Fitting and Carpentry
Safety aspects in Fitting and Carpentry, Study of tools and equipments, Preparation of models- Square, Dove tail joint, Cross Lap.
Sheet Metal and Welding
Safety aspects in Sheet metal and Welding, Study of tools and equipments, Sheet metal models - Scoope, Cone, Tray, Preparation weld joints -Lap, butt, T-joints. Study of Gas Welding and Equipments.
Electrical Wiring & Electronics
Safety aspects of Electrical wiring, Study of Electrical Materials and wiring components, Wiring circuit for a lamp using single and stair case switches. Wiring circuit for fluorescent lamps, Basic electronic circuit.
Plumbing
Study of plumbing tools, assembly of G.I. pipes/ PVC and pipe fittings, Cutting of threads in G.I.Pipes/PVC by thread cutting dies.
Smithy, Plastic Moulding and Glass Cutting
Safety aspects in smithy, plastic moulding and glass cutting, Study of tools and equipments.

Lab Manual :

1. . "Engineering Practices Lab Manual", Department of Mechanical Engineering, KSRCT.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
CO2	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
CO3	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
CO4	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2
CO5	3	2	2	1	3	2	2	3	1	2	2	1	3	1	2

K.S.Rangasamy College of Technology – Autonomous R2018

50 MA 005- Probability and Statistics

Common to CS,IT

Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	1	0	60	4	40	60	100

Objective(s)	• To acquire skills in the concepts of the probability • To provide exposure and ability in handling situations involving distributions. • To learn basic concepts in descriptive statistics and quantitative variables. • To develop the knowledge with various methods in hypothesis testing. • To get exposed to various statistical methods designed to make scientific judgments.

Course Outcomes	**At the end of the course, the students will be able to** CO1: Apply the concepts of one-dimensional random variables to calculate the probability. CO2: Apply discrete and continuous distributions concepts to calculate the probability. CO3: Compute measures of central tendency, measures of dispersion and calculate correlation and regression. CO4: Analyze the concepts in curve fitting methods and test the statistical hypothesis using Student's t test, F test and Chi-square test. CO5: Analyze the design of experiments using CRD, RBD and Latin square.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Probability and Random Variables

Axioms of probability – Conditional probability –Baye's theorem–Random variable – Expectation –Probability mass function – Probability density function – Properties – Moments – Moments generating function and their properties. [9]

Standard Distributions

Discrete Distributions: Binomial, Poisson and Geometric distributions – Continuous Distributions: Uniform, Exponential, Gamma and Normal distributions – Properties – Problems. [9]

Statistics

Measures of Central tendency – Mean, Median and Mode – Moments, Measure of dispersion – Skewness and Kurtosis – Range - Quartile deviation – Karl Pearson's Coefficient of skewness – Bowley's Coefficient of skewness – Correlation and Regression – Rank correlation. [9]

Sampling and Testing

Curve fitting by the method of least squares – Fitting of straight lines: $y = ax + b, y = ab^x$ – Second degree Parabola – Test of significance: small samples –Student's t-test, F-test, Chi-square test for goodness of fit and independence of attributes [9]

Design of Analysis

ANOVA – Completely Randomized Designs – One way classification – Randomized Block Design – Two way classification –Latin square design [9]

Total Hours: 45+15(Tutorial) 60

Text book (s) :

1. S.P.Gupta, "Statistical Methods", 45th Edition, Sultan Chand & sons, New Delhi, 2017.
2. T. Veerarajan, "Probability, Statistics and Random Processes", 3rd Edition, Tata McGraw-Hill, New Delhi, 2008.

Reference(s):

1. S.Ross, "A first Course in Probability", 5th Edition, Pearson Education, New Delhi, 2002.
2. R.A.Johnson, "Miller & Freund's Probability and Statistics for Engineers", 6th Edition, Pearson Education, New Delhi, 2000.
3. P.N. Arora and S.Arora,"Statistics for Management", S.Chand& Company Ltd., New Delhi, 2003.
4. V. K. Kapoor andS.C.Gupta , "Fundamentals of Mathematical Statistics ", pub: Sultan Chand & sons 12th Edition, New Delhi, 2020.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	-	-	-	-	-	-	2	2		
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2		
CO3	3	2	3	2	3	3	-	-	-	-	3	2	3		
CO4	3	3	3	3	3	3	-	-	-	-	3	3	3		
CO5	3	3	3	3	3	3	-	-	-	-	3	3	3		

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BoS Chairman Signature

50 CS 002 –Data Structures								
Common to CS,IT,EE,EC,AD								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	0	45	3	40	60	100

Objective(s)	• To choose the appropriate data structure for a specified application • To design and implement abstract data types such as linked list, stack , queue and trees • To demonstrate various sorting , searching and graph algorithms • To Learn and implement the hashing techniques • To design a Priority Queue ADT and its applications
Course Outcomes	**At the end of the course, the students will be able to** CO1: Express the concept of Linear data structures, applications and its implementations CO2: Appraise the knowledge of Tress with its operations CO3: Recognize the concept of Sorting ,Searching and its types CO4: Review various implementations and operations of Priority Queue and Hashing Techniques CO5: Apply Shortest Path and Minimum Spanning Tree algorithms and Biconnectivity

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Lists, Stacks and Queues [12]

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT

Trees [9]

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – B – Trees –B+Trees.

Sorting and Searching [7]

Preliminaries – Insertion Sort – Shell sort – Heap sort – Merge sort – Quick sort – External Sorting – Searching: Sequential search- Binary Search –Hashed list searches

Hashing and Priority Queues (Heaps) [7]

Hashing – Hash Function – Separate chaining – Open addressing – Rehashing – Extendible hashing Priority Queues (Heaps) – Model – Simple Implementations – Binary Heap – Applications of Priority Queues – d -Heaps.

Graphs [10]

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm, Kruskal's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity.

Total Hours 45

Text book(s):

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia,2008.
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009.

Reference(s) :

1. Rajesh K.Sukla," Data structure using C & C++", Wiley India,2012
2. A. Tannenbaum, "Data Structure Using C", Pearson Education, 2003.
3. Goodrich &Tamassia, "Data Structures and Algorithms in C++", 2nd Edition, John Wiley & Sons, 2011
4. Reema Thareja, "Data Structures Using C", 2nd Edition, Oxford Higher Education, 2014.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2									2		3	
CO2	1	3	2	2								2		3	3
CO3	1	3	2	2	2					2		2		3	3
CO4	1	3	2	2	3					2		2		3	
CO5	1	3	2		2		2			2		2		3	3

K. S. Rangasamy College of Technology – Autonomous R2018								
50 CS 003 – Object Oriented Programming								
Common to CS,IT, EE, NST								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total

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III / IV	3	0	0	45	3	40	60	100

Objective(s)

- To enable the students to learn how C++ supports object oriented properties
- To create and use classes, objects, constructors and destructors for specific applications
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs.

Course Outcomes

At the end of the course, the students will be able to

CO1: Recognize the principles of object-oriented problem solving and programming
CO2: Implement the concept of classes and objects
CO3: Analyze the concept of reusability and compile time polymorphism
CO4: Recognize the concept of dynamic memory allocation and runtime polymorphism
CO5: Identify the uses of generic programming and exception handling

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to C++ and Functions

Evolution of C++ - Concepts of OOP - Advantages of OOP, Basics of C++: Structure of a C++Program - Streams in C++ and Stream Classes - Unformatted Console I/O Operations, C++ Declarations, Functions: Return by Reference -Default Arguments - Const arguments - Inline Functions - Function Overloading. [9]

Classes and Objects, Constructors and Destructors

Classes in C++ - Declaring Objects- Access Specifiers and their Scope - Defining Member Functions - Static Members - Array of Objects - Object as Function Arguments - Friend Function and Friend Classes, Constructors and Destructors: Characteristics - Parameterized Constructor - Overloading Constructor - Copy Constructor - Dynamic Initialization Constructor – Destructors. [9]

Inheritance, Compile Time Polymorphism and Type Conversion

Inheritance: Reusability - Types of Inheritance - Abstract Classes - Object as Class Member, Operator Overloading: Rules for Operator Overloading – The Keyword Operator –Unary and Binary Operators Overloading-Overloading using Friend Function - Type Conversion. [10]

Pointers, Memory Models, Binding and Polymorphism

Pointers: Pointer to Class - Pointer to Object – void, wild and this Pointers – Pointer to Constant and Constant Pointers, Memory Models: Dynamic Memory Allocation - Heap Consumption - Dynamic Objects, Polymorphism: Binding in C++ - Pointer to Base and Derived class objects - Working with Virtual Functions - Pure Virtual Functions - Object Slicing - Virtual Destructor. [9]

Generic Programming with Templates, Exception Handling

Class Templates - Function Templates - Exception Handling: Principles of Exception Handling - try, throw and catch keywords - Re-throwing Exception - Specifying Exception. [8]

Total Hours 45

Text book(s):

1. Ashok N. Kamthane, “Programming in C++”, Pearson, 2nd Edition, 2016.
2. Herbert Schildt, “ The Complete Reference C++”, 4th Edition, McGraw-Hill Education, 2013.

Reference(s) :

1. Bjarne Stroustrup, “The C++ programming language”, Addison Wesley, 2013.
2. Venugopal K.R., Rajkumar Buyya, ”Mastering C++”, 2nd Edition, McGraw-Hill Education, 2013.
3. Rajesh K. Shukla, ”Object-Oriented Programming in C++”, Wiley-India Edition, 2008
4. E Balagurusamy, ”Object Oriented Programming with C++”, 6th Edition, McGraw-Hill Education, 2013.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		3	3	1				2		2		3		
CO2	3		3	3	1				2		2		3		
CO3	2		3	2					2		2		3		
CO4	2		3	2									3		
CO5	3		3	2					2		2		3		

K.S.Rangasamy College of Technology – Autonomous R 2018				
50 EC 002 - Digital Logic Circuits				
Common to CS, IT				
Semester	**Hours / Week**	**Total hrs**	**Credit**	**Maximum Marks**

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	L	T	P		C	CA	ES	Total
III	3	1	2	90	5	50	50	100

Objective(s)	• To introduce number systems and codes, basic postulates of Boolean algebra and show the correlation between Boolean expressions. • To design and analyse combinational circuits • To study the concept of sequential circuits. • To analyse the concept of asynchronous sequential circuits. • To introduce the concept of memories and programmable logic devices.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Explain the fundamentals of numbering system and apply Boolean algebra to design digital systems CO2: Analyze digital logic family and design combinational circuits CO3: Design and analyze synchronous sequential logic circuits CO4: Analyze the asynchronous sequential circuits. CO5: Explain the various semiconductor memories and implement combinational logic using PLDs

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Digital Fundamentals

Review of Number Systems –Conversion methods – complements –Binary codes: Weighted and non Weighted codes - Boolean postulates and laws – De-Morgan's Theorem - Boolean function - Logic Gates- Implementations of Logic Functions using logic gates, Minimization of Boolean expressions – Sum of Products (SOP) – Product of Sums (POS)- Canonical forms –– Karnaugh map Minimization – Don't care conditions [9]

Logic Family and Combinational Circuits

TTL and CMOS Logic families and their characteristics.

COMBINATIONAL CIRCUITS: Design procedure – Adders - Subtractors – Serial,Parallel adder- BCD adder - Magnitude Comparator – Multiplexer / Demultiplexer - encoder / decoder – code converters: binary to gray, gray to binary, BCD to excess 3 code [9]

Sequential Circuits

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation – Application table – Edge triggering – Level Triggering –Ripple counters – Synchronous counters –Modulo – n counter–Design of Synchronous FSM– Analysis of clocked sequential circuits: state equation - State table – State diagram – State reduction & assignment - Register : shift registers - Universal shift register– Shift counters [9]

Asynchronous Sequential Circuits

Analysis procedure – Transition table - Flow table – Race conditions -Design of fundamental mode circuits – Primitive flow table – Reduction of state and flow table – Race free state assignment - Hazards: Static – Dynamic – Essential – Hazards elimination. [9]

Memory Devices

Classification of memories: ROM - PROM – EPROM – EEPROM – EAPROM, RAM. Static RAM Cell- Dynamic RAM cell Bipolar RAM cell – MOSFET RAM cell ––Programmable Logic Devices: Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, and PAL. [9]

Practice:

1. Design and implement combinational circuits using logic gates
2. Design and implement synchronous sequential circuits
3. Construct and simulate combinational circuit using multisim
4. Construct and simulate synchronous & asynchronous sequential circuit using multisim

Tutorials:

1. Number system, logic gates, K-map reduction
2. Design of combinational circuits
3. Design of sequential and asynchronous sequential circuits
4. Hazards, PLDs Implementation of combinational logic circuit using ROM, PLA, PAL

Total Hours: 45+15(practice)+15(Tutorial) 60

Text book(s):

1. M. Morris Mano, Michael D. Ciletti, "Digital Desig", 5th Edition, Pearson Education, New Delhi, 2016.

2.	Anand Kumar, “Fundamentals of Digital Circuits”, 3rd Edition, Prentice Hall, 2016.
Reference(s) :	
1.	Donald P.Leach and Albert Paul Malvino, GoutamSaha, “Digital Principles and Applications” , 7th Edition, Tata McGraw-Hill, New Delhi, 2016.
2.	S. Salivahanan and S. Arivazhagan, “Digital Circuits and Design”, 3rd Edition, Vikas Publishing House Pvt. Ltd, New Delhi, 16
3.	John F.Wakerly, “Digital Design: principles and practices”, 4th Edition, Pearson Education, 2016.
4.	Charles H.Roth, “Fundamentals of Logic Design”, 5th Edition, Brooks/cole, 2016.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2								3	2	
CO2	3	3	3	3	2								3	2	
CO3	3	3	3	3	2								3	2	
CO4	3	3	3	3	2								3	2	
CO5	3	3	3	3	2								3	2	

K. S. Rangasamy College of Technology – Autonomous R2018

50 IT 301 - Software Engineering

IT

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	3	0	2	60	4	50	50	100

Objective(s)

- To apply the software engineering lifecycle by demonstrating competence in communication,planning,analysis,design,construction and deployment
- To design and apply the UML models and its techniques that provide a basis for software design
- To implement the various testing strategies
- To improve the quality in software environment
- To provide an ability to use the techniques and tools necessary for engineering practice

Course Outcomes

At the end of the course, the student will be able to

CO1: Apply the software engineering process, SDLC models, agile process models and risk management

CO2: Design the requirement engineering and UML models in software development process

CO3: Develop architectural design and assess the software configuration management

CO4: Implement the different software testing techniques including WebApps

CO5: Analyze software quality, decomposition techniques and schedule the projects with software reengineering techniques

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Software Process

A Generic process models – Perspective process models – Waterfall – Incremental – Evolutionary process model – Component based development – The unified process – Agile process – Agile models: Adaptive software development – Dynamic systems development method – Risk management : Risk identification – Risk projection – Risk refinement. [9]

Software Analysis

Requirement engineering tasks – Eliciting requirements – Requirement analysis – Scenario based modeling – UML models – Data modeling concepts – Class based modeling – Flow oriented modeling – Behavioral model. [9]

Software Design

Design concepts – Design models – Architectural design – Architectural mapping using data flow – Pattern based design : Design patterns – Architectural patterns – Web App design patterns – User Interface Design – Software Configuration Management – SCM Process – Configuration management for Web Apps. [9]

Software Testing

Software testing – Strategic Issues – Test strategies for conventional and Object oriented software – Test strategies for Web Apps – Validation testing – System Testing – White box testing – Basis path testing – Control structure testing – Black box testing – Testing GUI – Testing Client/Server – Test documentation. [9]

Software Project Management

Quality concepts – Software quality – Software Quality Assurance: Elements of SQA – SQA tasks – Goals and metrics – Software project estimation – Decomposition techniques: Software sizing – Problem based estimation – An Example of FP based estimation – Empirical estimation models – Project scheduling – Software reengineering – Forward engineering – Reverse engineering – Tools related trends in software engineering. [9]

Total Hours: 45+15(Practical) 60

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/.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3					3	3	3		3	3	
CO2		3	3							3	3		3	3	
CO3		2	3		3						2		2	3	
CO4	2				3								3	3	
CO5			2		3				3	3	3		3	3	3

K. S. Rangasamy College of Technology – AutonomousR2018

50 MY 002 - Environmental Science

Common to all Branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	2	0	0	30	0	100	-	100

Objective(s)

- To help the learners to analyze the importance of ecosystem and biodiversity.
- To familiarize the learners with the impacts of pollution and control.
- To enlighten the learners about waste and disaster management.
- To endow with an overview of food resources and human health.
- To enlighten awareness and recognize the social responsibility in environmental issues.

Course Outcomes

At the end of the course, the student will be able to

CO1.Recognize the concepts and importance of environment, ecosystem and biodiversity.
CO2.Analyze the source, effects, and control measures of pollution.
CO3.Enlighten of solid waste and disaster management.
CO4.Alertness about food resources, population and health issues.
CO5.Analyze the social issues and civic responsibilities.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Environment, Ecosystem and Biodiversity

Environmental studies - Scope and multidisciplinary nature - Need for public awareness - Ecosystem - Food chain - Food web- Structure and function. Biodiversity - Values of biodiversity - Endangered and endemic species - Hot spots - India a mega biodiversity nation - Threats - Conservation - In-situ and ex-situ - Case studies. [6]

Environmental Pollution

Pollution - Air, water, soil, noise and nuclear - sources, effects and control measures - Impacts of mining. - Environment protection act- bio accumulation and bio magnification - Case studies. [6]

Waste and Disaster Management

Waste – wealth from waste - carbon foot print - Solid waste - e-waste - sources, effects and control measures. Disaster management - Earth quakes - Landslides - Floods - Cyclones - Tsunami - Disaster preparedness - Case studies. [5]

Food Resources, Human Population and Health

World food problems - over grazing and desertification - effects of modern agriculture. Population - Population explosion and its impacts - HIV/AIDS - Cancer- Role of IT in environment and human health - Case studies. [6]

Social Issues and the Environment

Unsustainable to sustainable development - Use of alternate energy sources - Wind - Geothermal - Solar - Tidal - energy calculation and energy audit - Rain water harvesting - Water shed management - Deforestation - Green house effect - Global warming - Climate change - Acid rain - Ozone layer depletion - Waste land reclamation. Consumerism and waste products - Role of an individual in conservation of natural resources - Case studies. [7]

Total Hours 30

Text Book(s):

1.	Anubha Kaushik and C P Kaushik, "Perspectives in Environmental Studies " , New Age International Publishers, New Delhi, 6th edition , January 2018.
2.	Tyler Miller. G, "Environmental Science", Cengage Publications, Delhi, 16th edition, 2018.

Reference(s):

1.	Gilbert M.Masters and Wendell P. Ela, "Environmental Engineering And Science", PHI Learning Private Limited, New Delhi, 3rd Edition, 2013.
2.	Rajagopalan. R, "Environmental Studies" Oxford University Press, New Delhi, 2nd edition, 2012.
3.	Deeksha Dave and Katewa. S.S, "Environmental Studies", Cengage Publications, Delhi, , 2nd edition , 2013.
4.	Cunningham, W.P. and Saigo, B.W. Environment Science, Mcgraw-Hill, USA. 9th edition, 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	1	1	2	3	3	3	3		2	1	1	1
CO2	3	3	3	3	2	3	3	3	3	3	2	2	2	2	2
CO3	3	3	3	3	2	3	3	3	3	3	2	2	2	2	2
CO4	2	2	2	3	3	3	3	3	2	2	3	2	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2

K. S. Rangasamy College of Technology – Autonomous R2018

50 CS 0P2 - Data Structures Laboratory

Common to CS,IT,EE,EC,AD

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III	0	0	4	60	2	60	40	100

Objective(s)

- 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

Course Outcomes

At the end of the course, the students will be able to

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

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. Search Tree ADT
6. Implementation of Internal Sorting
7. Develop a program for external sorting
8. Develop a program for various Searching Techniques.
9. Implementation of Shortest Path algorithm
10. Implementation of Minimum Spanning tree algorithm.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2	3						2		2		3	
CO2	1	3	2	3						2		2		3	
CO3	1	3	2	3						2		2		3	3
CO4	1	3	2	3	3					2		2		3	3
CO5	1	3	2	3	3		3			2		2		3	3

K. S. Rangasamy College of Technology – Autonomous R2018

50 CS 0P3 - Object Oriented Programming Laboratory

Common to CS,IT, EE, NST

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
III / IV	0	0	4	60	2	60	40	100

Objective(s)

- To design various UML diagrams and develop object oriented programs using C++ with associated libraries.
- To learn how to implement class, objects, constructors and destructors in C++.
- To learn how to overload functions and operators in C++.
- To learn how inheritance promote code reuse in C++.
- To apply exception handling and use built in classes from STL.

Course Outcomes

At the end of the course, the students will be able to

CO1: Demonstrate the input/output operations and user defined functions
CO2: Implement the concept of class and objects
CO3: Demonstrate the concept of reusability and compile time polymorphism
CO4: Implement the concept of dynamic objects and runtime polymorphism
CO5: Demonstrate the concept of templates and exception handling

List of Experiments

The laboratory should be preceded by a tutorial to design UML diagrams.

1. Construct a C++ program to manage the input and output operations using stream classes
2. Construct a C++ program to manage large amount of statements using functions
3. Design a C++ program to implement the concept of class and objects
4. Develop a C++ program to initialize the class members using constructors and destroy the objects by using destructor
5. Design a C++ program for reusability using inheritance
6. Write a C++ program to perform compile time polymorphism
7. Develop a C++ program to implement the concept of dynamic objects
8. Develop a C++ program to implement runtime polymorphism
9. Develop a C++ program to allow functions and classes to operate with generic types using templates.
10. Construct a class in C++ to handle predefined and user defined exceptions

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		3		2	2		1					3		
CO2	3		3		2	2		1					3		
CO3	3		3		2			1					3		
CO4	3		3										3		
CO5	3		3										3		

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50 TP 0P1 - Career Competency Development I

Semester	Hours/Week			Credit	Maximum Marks		
	L	T	P	C	CA	ES	Total
III	0	0	2	0	100	00	100

Objective(s)

- To help learners to enrich their grammatical correctness and vocabulary efficacy in the academic and professional contexts.
- To help the learners to frame syntactical structures of sentences and comprehend the meaning of reading passages effectively
- To help learners to adeptly sequence the information, draft letters and correct usage of foreign words with correct spelling and punctuation.
- To help the learners to introduce themselves and involve in situation conversations professionally
- To help learners to make various modes of presentations and express their opinion in a conducive way.

Course Outcomes

At the end of the course, the student will be able to

CO1: Reinforce the essential grammatical correctness and vocabulary efficacy in the academic and professional contexts

CO2: Generate syntactical structures and infer the semantics in the reading passages effectively

CO3: Reorganize and compose the sequential information, letter drafts, and interpret the appropriate usage of foreign words with correct spelling and punctuation

CO4: Demonstrate their introduction and relate to situational conversations adeptly

CO5: Exhibit various modes of presentations and organize their opinions in an expressive way

Unit – 1	**Written Communication – Part 1**	**Hrs**
Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition - Change of Voice - Change of Speech - Synonyms & Antonyms - One Word Substitution - Using the Same Word as Different Parts of Speech - Odd Man Out **Materials:** Instructor Manual, Word Power Made Easy Book		8
Unit – 2	**Written Communication – Part 2**	6
Analogies - Sentence Formation - Sentence Completion - Sentence Correction - Idioms & Phrases - Jumbled Sentences, Letter Drafting (Formal Letters) - Reading Comprehension(Level 1) - Contextual Usage - **Materials:** Instructor Manual, Word Power Made Easy Book		
Unit – 3	**Written Communication – Part 3**	4
Jumbled Sentences, Letter Drafting (Formal Letters) - Foreign Language Words used in English - - Spelling & Punctuation (Editing) **Materials:** Instructor Manual, News Papers		
Unit – 4	**Oral Communication – Part 1**	6
Self Introduction - Situational Dialogues / Role Play (Telephonic Skills) - Oral Presentations- Prepared - 'Just A Minute' Sessions (JAM) **Materials:** Instructor Manual, News Papers		
Unit – 5	**Oral Communication – Part 2**	6
Describing Objects / Situations / People, Information Transfer - Picture Talk - News Paper and Book Review **Materials:** Instructor Manual, News Papers		
TotalHrs		**30**

Evaluation Criteria

S.No.	Particular	Test Portion	Marks

Rev.No.5 / w.e.f. 10/07/2023
Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

1	Evaluation 1 Written Test	50 Questions – 30Questions from Unit 1 &2, 20 Questions from Unit 5, (External Evaluation)	50
2	Evaluation 2 Oral Communication 1	Self Introduction, Role Play & Picture Talk from Unit-3 (External Evaluation by English and MBA Dept)	30
3	Evaluation 3 Oral Communication 2	Book Review & Prepared Speech from Unit-4 (External Evaluation by English and MBA Dept)	20
Total Hours			**100**

Reference Books

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.	Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

Note :

- Instructor can cover the syllabus by Class room activities and Assignments(5 Assignments/week)
- Instructor Manual has Class work questions, Assignment questions and Rough work pages
- Each Assignment has 20 questions from Unit 1, 2 and Unit 5 and 5 questions from Unit 3 and 4
- Evaluation has to be conducted as like Lab Examination.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1		2	1	2	3	3	2	3		1	3
CO2	1	1	1	1	1	2	1	2	3	3	3	3	1	2	3
CO3	1	1	1	1	1	2	1	2	3	3	2	3		2	3
CO4	1	1	1	1		2	1	1	2	3	2	3	1	2	3
CO5	1	1	1	1	1	2	1	2	3	3	2	3	1	3	3

K.S.RangasamyCollegeofTechnology–AutonomousR2018								
51MA011- DiscreteMathematics								
CommontoCSE &IT								
Semester	Hours/Week			Totalhrs	Credit	MaximumMarks		
	L	T	P	60	C	CA	ES	Total
IV	3	1	0		4	50	50	100

Objective(s)	• To extend students logical and mathematical maturity and ability to deal with abstraction. • To know the challenge of the set theory to computer science and engineering problems. • To aware the applications of algebraic structures. • To familiarize computational thinking, critical thinking of combinatorics. • To understand the concepts of graph theory.
CourseOutcomes	**At the end of the course, the students will be able to** CO1:Analyze the notion of mathematical, algorithmic thinking and be able to apply the min problems CO2:Represent characteristics of sets, relation, functions. CO3: Acquire the knowledge of algebraic techniques to analyze basic discrete structures and algorithms CO4:Compute the numbers of possible outcomes of elementary permutations and combinations CO5:Evaluate the knowledge of graphs and related discrete structures of network techniques

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth.Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

MATHEMATICAL LOGIC

Propositional logic–Propositional equivalences–Predicates and quantifiers–Rules of inference. [9]

SET THEORY

Sets – Set Operations – Relations and Their Properties– Representing Relations– Equivalence relations –Functions. [9]

ALGEBRAIC STRUCTURES

Algebraic systems– Semi groups and monoids- Groups – Subgroups –Homomorphism‘s–Normal subgroup and cosets–Lagrange‘s theorem –Definitions and examples of Rings and Fields [9]

COMBINATORICS

Permutations and Combinations- Pigeonhole Principle-Mathematical induction–Recurrence relations– Generating functions. [9]

GRAPH THEORY

Graph sand graph models–Graph terminology and special types of graphs–Matrix representation of graphs and graph isomorphism–Connectivity–Euler and Hamilton paths. [9]

TotalHours: 45+ 15(Tutorial)= **60hours**

Text book(s):

1	T. Veerarajan,” Discrete Mathematics with Graph Theory and combinatorics” Fifth Reprint, Tata Mc Graw Hill Publishing Company Limited. 2008.
2	J.P.Tremblay and RM anohar,“Discrete Mathematical Structures with Applications to Computer Science”, McGraw–Hill Education Private Limited,New Delhi, 49th reprint 2016

Reference(s):

1	K.H.Rosen, “DiscreteMathematicsanditsApplications”,7thEdition,TataMcGrawHillPub.Co.Ltd., NewDelhi,Special Indian Edition, 2011.
2	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, “Discrete Mathematical Structures”, FourthIndian reprint,PearsonEducationPvtLtd.,NewDelhi,2003.
3	R.P.Grimaldi, "Discrete andCombinatorialMathematics:AnAppliedIntroduction",4thEdition, PearsonEducation Asia,Delhi,2007
4	S.LipschutzandMark Lipson,"DiscreteMathematics",Schaum‘sOutlines,TataMcGrawHillPub.Co. Ltd., NewDelhi,3rdEdition,2010.

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Generate the truth table for mathematical logic.
3. Various functions for set operations like union, intersection etc.
4. Generate Cayley’s representation table for algebraic structures.
5. Compute permutations and combinations functions.
6. Solve the problem about isomorphism of two graphs.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2							3		3	
CO2	3	3	2	2	2							2		2	3
CO3	3	3	2	3	2							2		3	2
CO4	3	3	2	3	2							2		2	3
CO5	3	3	2	3	3							3		3	3

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51 IT 001 - Design and Analysis of Algorithms

Common to CS, IT, AD

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	2	0	2	45	3	50	50	100

Objective(s)

- 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.

Course Outcomes

At the end of the course, the students will be able to

CO1: Classify the problem types and compare orders of growth to represent asymptotic notations.

CO2: Apply and inspect recursive and non-recursive algorithms by mathematical notations using sample algorithms.

CO3: Apply 'Brute Force' and 'Divide and conquer' design techniques for sorting and searching problems.

CO4: Construct analogous algorithms for graph related problems.

CO5: Apply 'Backtracking' and 'Branch and bound' techniques to solve NP-hard problems.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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]

Lab Exercise: Implement a Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted .The elements can be read from a file or can be generated using the random number generator.

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]

Lab Exercise: Implementation of Binary search algorithm using Divide & Conquer method.

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]

Lab Exercise: Implementation of Merge Sort algorithm using Divide & Conquer method.

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]

Lab Exercise: Implement 0/1 Knapsack problem using Dynamic Programming.

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]

Lab Exercise: Implement N Queen's problem using Back Tracking.

Total Hours 45

Rev.No.5 / w.e.f. 10/07/2023

Passed in BoS Meeting held on 16/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Text book(s):	
1.	AnanyLevitin, “Introduction to the Design and Analysis of Algorithm”, 3rd Edition, Tenth Impression, Pearson Education Asia, 2017.
2.	T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, “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.	A.V.Aho, J.E. Hopcroft and J.D.Ullman, “The Design and Analysis of Computer Algorithms”, Pearson Education Asia, 2003.
3.	Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, “Computer Algorithms/ C++”, 2nd Edition, Universities Press, 2007.
4.	Anany Levitin, “Introduction to the Design & Analysis of Algorithms”, 2nd Edition, Pearson Education, 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		3									3	2	
CO2	3	3		3									3	2	
CO3	3	3	3	2	3								3	2	
CO4	3	3	3	2									3	2	
CO5	3	3	3	2	3								3	2	

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51 IT 401 - Java Programming

IT

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

Objective(s)

- To develop programs using Java standard classlibraries
- To create distributed applications using RMI
- To develop programs using Collection APIs
- To analyze and develop applications with JDBC technology for real world problems
- To explore and develop server side applications with servlet

Course Outcomes

At the end of the course, the students will be able to

CO1: Express the concept of classes,objects and exhibit reusability through inheritance along with string and array

CO2: Extrapolate code reduction and access different operations through packages, interfaces, multithreading with exception handling and perform remote method invocation

CO3: Appraise the importance of packages and collections framework

CO4: Explore the database concepts with JDBC connectivity with Regular expression

CO5: Design the application using Servlets and JSP with MVC architecture

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Java Introduction

An overview of Java, Classes and Methods, Inheritance, Arrays, String handling with String and String Buffer classes. [9]

Java Concepts

Packages and Interfaces, Exception handling, Multithreaded programming-The Java Thread Model,The Main Thread,Creating a Thread, Creating multiple Threads, Thread priority,Synchronization, Remote Method Invocation (RMI). [9]

Collection Framework

Wrapper classes, Object cloning, The Collection Interfaces - List, Set, Map, The Collection Classes, Using an Iterator, StringTokenizer, The Byte Streams, The Character Streams, Serialization. [9]

Regex and Java Database Connectivity

Regular Expression: Matcher Class, Pattern class and Pattern Syntax Exception class, Regex Character Classes and Quantifiers,Metacharacters.Java Database Programming-Introduction, Relational Database Systems,DML, DDL, DCL and TCL, JDBC, Statement, Prepared Statement. [9]

MVC Architecture, Servlets and JSP

Java MVC Architecture: Three-tier architecture, Introduction to MVC, MVC Architecture, Advantages of MVC, Building pages with MVC-Server-Side Programming: Servlet Architecture, Servlet Classes and Interfaces, Servlet Life cycle, Servlet Get and Post Method, Executing Servlet-JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC. [9]

Total Hours 45

Text book(s):

1. Herbert Schildt, "Java : The complete Reference", Comprehensive coverage of the Java language, Oracle press, 10th Edition, Tata McGraw-Hill, 2017.
2. Harvey. M. Dietal, Advanced Java 2 Platform, How to Program, 2nd Edition, Prentice Hall, 2002.

Reference(s) :

1. William Crawford & Jason Hunter "Java Servlet Programming" 2nd Edition, Publisher : O'Reilly's, 2010.
2. Y.Daniel Liang, "Introduction to Java Programming", Comprehensive Version, 10th Edition, Pearson Education,2015 [JDBC only]
3. Bert Bates and Kathy Sierra, "Head First Java", 2nd Edition, Publisher : O'Reilly's, 2009.
4. Jeffrey E. F. Friedl, "Mastering Regular Expressions", 3rd Edition, O'Reilly Media, Inc.,2006
5. Online Resources : https://www.tutorialspoint.com, https://www.javatpoint.com, https://www.journaldev.com, https://beginnersbook.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1			1				1	2	3	2
CO2	3	3	3	2	1			1				1	2	3	2
CO3	3	3	3	2	1			1				1	2	3	2
CO4	3	3	3	2	1			1				1	2	3	2
CO5	3	3	3	2	1			1				1	2	3	2

K. S. Rangasamy College of Technology – Autonomous R2018

50 IT 402 - Computer Organization and Architecture

IT

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

Objective(s)

- 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 analyze the parallel processing techniques
- To examine the components involved in the design of a embedded computer system

Course Outcomes

At the end of the course, the student will be able to

CO1: Identify the basic functional units of a computer system and the architecture of 8086 microprocessor

CO2: Illustrate the physical and virtual memory systems

CO3: Analyze the concept of basic processing unit and I/O organization

CO4: Examine the techniques applied for enhancing the performance of processor

CO5: Design a complete embedded computer system

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Basic Structure of Computers

Functional units – Basic operational concepts – Memory locations and addresses – Memory operations – Introduction to 8086 Architecture – Addressing modes – Instruction set – RISC and CISC styles – Case study: Assembly language programs for 8086 microprocessor. [11]

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 Organisation

Instruction Execution – Hardware Components – Hardwired control – Microprogrammed control – Bus operation – Bus arbitration – Interface circuits – Interconnection standards (PCI,SCSI,USB) – Accessing I/O devices – Interrupts [8]

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	[8]
Total Hours	**45**

Text Book(s):	
1.	Carl Hamacher, ZvonkoVranesicSafwatZaky and NaraigManjikian, “Computer Organisation and Embedded Systems”, 6thEdition, McGraw Hill International Edition, 2017.
2.	Soumitra Kumar Mandal, “Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 and 8051”, 7th Edition, McGraw Hill India, 2013.
Reference(s):	
1.	William Stallings, “Computer Organisation& Architecture – Designing for Performance”, 10th Edition, Pearson Education,2016.
2.	David A.Patterson and John L.Hennessy, “Computer Organisation& Design, the hardware / software interface”,5thEdition, Morgan Kaufmann,2014.
3.	Morris Mano M, “Computer System Architecture”, 3rd Edition, Pearson Education, 2017.
4.	Douglas E. Comer, “Essentials of Computer Architecture”, 6th Edition, Pearson Education, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

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50 IT 403 - Operating Systems

IT

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

Objective(s)	• To understand the services provided by and the design of an operating system. • To analyze the components of an operating systems have a thorough knowledge of process management. • To understand different approaches to memory management. • To analyze and explain the algorithms used in Virtual Memory Management. • To discuss the algorithms used in I/O and File Management.
Course Outcomes	**At the end of the course, the student will be able to** CO1: Recognize the basics of operating systems and its components CO2: Examine the scheduling algorithms and critical section problem. CO3: Acquire the knowledge of Deadlock and Storage Management CO4: Outline the memory management scheme and File concept. CO5: Analyze the concept of allocation methods, directory structure and free space management

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap Space Management. [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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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	

K.S.Rangasamy College of Technology – Autonomous R2018

50 MY 014 – Start-ups and Entrepreneurship

Common to all Branches

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	2	0	0	30	-	100	-	100

Objective(s)

- To provides practical proven tools for transforming an idea into a product or service that creates value for others.
- To build a winning strategy, how to shape a unique value proposition, prepare a business plan
- To impart practical knowledge on business opportunities
- To inculcate the habit of becoming entrepreneur
- To know the financing, growth and new venture & its problems

Course Outcomes

At the end of the course, the student will be able to

CO1: Transform ideas into real products, services and processes, by validating the idea, testing it, and turning it into a growing, profitable and sustainable business.

CO2: Identify the major steps and requirements in order to estimate the potential of an innovative idea as the basis of an innovative project.

CO3: Reach creative solutions via an iteration of a virtually endless stream of world-changing ideas and strategies, integrating feedback, and learning from failures along the way.

CO4: Apply the 10 entrepreneurial tools in creating a business plan for a new innovative venture.

CO5: Apply methods and strategies learned from interviews with startup entrepreneurs andinnovators.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.	
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.	[6]
Business Opportunity Identification and Preparing a Business Plan Business ideas, methods of generating ideas, and opportunity recognition, Idea Generation Process, Feasibility study, preparing a Business Plan: Meaning and significance of a business plan, components of a business plan.	[6]
Innovations Innovation and Creativity - Introduction, Innovation in Current. Environment, Types of Innovation, School of Innovation, Analysing the Current Business Scenario, Challenges of Innovation, Steps of Innovation Management, Experimentation in Innovation Management, Participation for Innovation, Co-creation for Innovation, Proto typing to Incubation. Blue Ocean Strategy-I, Blue Ocean Strategy-II. Marketing of Innovation, Technology Innovation Process	[6]
Financing & Launching the New Venture Importance of new venture financing, types of ownership, venture capital, types of debt securities, determining ideal debt-equity mix, and financial institutions and banks. Launching the New Venture: Choosing the legal form of new venture, protection of intellectual property, and formation of the new venture	[6]
Managing Growth & Rewards in New Venture Characteristics of high growth new ventures, strategies for growth, and building the new ventures. Managing Rewards: Exit strategies for Entrepreneurs, Mergers and Acquisition, Succession and exit strategy, managing failures – bankruptcy	[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 McGrawhill Company, New Delhi, 2013.
2.	Charles Bamford and Garry Bruton, “ENTREPRENEURSHIP: The Art, Science, and Process for Success”, 2nd Edition, Tata McGrawhill 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	Howard Love, “The Start-Up J Curve: The Six Steps to Entrepreneurial Success”, Book Group Press, 2011

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	1	2	1		2	2	2	1	
CO2	2	3	3	2	2		2	2	2		2	2	3		
CO3	3	2	3	1	2				1	3	1	3	3		
CO4	3	3	3	3	3	2	2	1		1	3	3	3		
CO5	3	2	3	3	3			2			3	2	2		

K.S.Rangasamy College of Technology – Autonomous R2018							
50 GE 001 – National Cadet Corps(Air Wing)							
Semester	Hours / Week			Total Hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
IV	1	0	1	30	3	40	60	100
Objective(s)	• Developcharacter , camaraderie, • Inculcate discipline, secular outlook • Enrich the spirit of adventure, sportsman spirit • Ideals of selfless service amongst cadets by working in teams							

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Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

	• Improve qualities such as self-discipline, self-confidence, self-reliance and dignity of labour in the cadets.
Course Outcomes	**At the end of the course, the 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. CO2: Demonstrate the sense of discipline with smartness and have basic knowledge of weapons and their use and handling CO3: Illustrate various forces and moments acting on aircraft CO4: Outline the concepts of aircraft engine and rocket propulsion CO5: Design, build and fly chuck gliders/model airplanes and display static models

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

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. History and Organization of IAF-Indo-Pak War-1971-Operation Safed Sagar. National Integration- Unity in diversity- contribution of youth in nation building- national integration council- Images and Slogans on National Integration	[9]
Drill&WeaponTraining 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). Main Parts of a 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)	[9]
Principles of Flight Laws of motion-Forces acting on aircraft–Bernoulli's theorem-Stalling-Primary control surfaces – secondary control surfaces-Aircraft recognition.	[9]
Aero Engines Introduction of Aero engine-Types of engine-piston engine-jet engines-Turboprop engines-Basic Flight Instruments-Modern trends.	[9]
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.	[9]
Total Hours	**45**

Text Book(s):	
1.	"National Cadet Corps- A Concise handbook of NCC Cadets" by Ramesh Publishing House, New Delhi,2014.
2.	"NCC OTA Precise" by DGNCC, New Delhi,2014
Reference(s)	
1.	"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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						3	3	3	3	3		3			
CO2					3						3	2			
CO3	3	2	1	1											
CO4	3	2	1	1											
CO5	3	2	1	1											

K.S.Rangasamy College of Technology – Autonomous R2018								
50 GE 002 – National Cadet Corps (Army Wing)								
Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	1	0	1	30	3	40	60	100
Objective(s)	• 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.
Course Outcomes	**At the end of the course, the 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. CO2:DemonstrateHealth Exercises, the sense of discipline, improve bearing, smartness, turnout, develop the quality of immediate and implicit obedience of orders. CO3: Basic knowledge of weapons and their use and handling. CO4:Aware about social evils and shall inculcate sense of whistle blowing against such evils and ways to eradicate such evils CO5: Acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information about expansion of Armed Forces, service subjects and important battles

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

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. [9]

National Integration - Unity in diversity- contribution of youth in nation building- national integration council- Images and Slogans on National Integration.

Basic Physical Training & Drill

Basic physical Training – various exercises for fitness(with Demonstration)-Food – Hygiene and Cleaniness.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) [9]

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. [9]

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-SGSY-JGSY-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 [9]

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. [9]

Total Hours	**45**

Text Book(s):

1.	National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014
2.	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
2.	"Cadets Handbook – Specialised Subjects SD/SW" by DG NCC, New Delhi,2017

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						1		3							
CO2								2							
CO3						1		3							
CO4								2							
CO5								3							

K.S. Rangasamy College of Technology - Autonomous R2018								
52 IT 4P1 - Java Programming Laboratory								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	0	0	4	60	2	60	40	100
Objective(s)	• To develop programs using basic concepts of Java • To create distributed applications using RMI • To provide the permanent storage for programs using files • To design and develop the programs using collection APIs • To analyze and develop server side applications with JDBC technology for real world problems							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Implement programs using object oriented concepts CO2: Develop programs with the concept of interfaces, packages, exception handling and multi-threading CO3: Perform remote communication and Implement the file operations CO4: Develop programs using Collections with JDBC CO5: Execute server side program using servlet							
List of Experiments								
1. Class and Objects 2. Interfaces and Packages 3. Exception handling. 4. Inter thread communication and deadlock avoidance. 5. RMI 6. Regular Expression 7. File operations 8. Collections 9. JDBC 10. Servlet and JSP 11. **Mini project :** Develop an application using the concepts of Interfaces, Packages, Exception handling and collections along with JDBC.								

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

K. S. Rangasamy College of Technology – Autonomous R2018								
51 IT 4P2 - Operating Systems and Open Source Laboratory								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
IV	0	0	4	60	2	60	40	100
Objective(s)	• 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							
Course Outcomes	**At the end of the course, the student will be able to** CO1: Implement the basic commands to implement shell programming CO2: Implement the various system calls commands of UNIX CO3: Design the scheduling process using FCFS and SJF scheduling CO4: Demonstrate Page replacement policies concept using FIFO method CO5: Demonstrate the Perl programming using Arithmetic operation, Loop, String, functions							

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. To write a c program to 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. 11. Configuration of DNS, DHCP. 12. Configuration of device like Printer, Ethernet and TCP /IP. 13. Perl programming • Arithmetic operation • Loop • String • Functions

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2								2	2	3
CO2	3	3	3	2	2								2	2	3
CO3	3	3	3	2	2								2	2	3
CO4	3	3	3	2	2								2	2	3
CO5	3	3	3	2	2								2	2	3

K. S. Rangasamy College of Technology – Autonomous R2018							
50 TP 0P2 – Career Competency Development II							
Semester	**Hours/Week**			**Credit**	**MaximumMarks**		
	L	**T**	**P**	**C**	**CA**	**ES**	**Total**
IV	**0**	**0**	**2**	**0**	**100**	**00**	**100**

Objective(s)	• To help the learners to paraphrase the reading passages, to draft continuous writing and review texts in the academic and professional contexts • To help the learners to acquire the phonetic skills of the language and express themselves precisely for effective professional presentations • To help the learners to enrich their verbal reasoning and ability to match the employability requirements of the corporates • To help the learners to comprehend the preliminary level of aptitude skills required to attend placement and competitive online exams • To help the learners to comprehend the Pre - Intermediate level of aptitude skills required to attend placement and competitive online exams
Course Outcomes	**At the end of the course, the student will be able to** CO1: Interpret and infer the meaning in the reading passages, organize continuous writing and review texts both academically and professionally. CO2: Adapt to and demonstrate the phonetic skills accurately for effective presentations professionally. CO3: Interpret the various concepts of verbal reasoning and relate for the concepts to the requirements of the competitive exams and employability CO4: Infer the concepts of preliminary level of aptitude skills pertaining to competitive exams and company recruitments. CO5: Infer the concepts of pre-intermediate level of aptitude skills pertaining to competitive exams and company recruitments.

Unit–1	Written Communication– Part3	Hrs
Reading Comprehension Level 2 (Paraphrasing Poems) - Letter Drafting - Email Writing – Paragraph Writing - Newspaper and Book Review Writing - Skimming and Scanning - Interpretation of Pictorial Representations. **Practices:**Sentence Completion – Sentence Correction – Jumbled Sentences – Synonyms & Antonyms – Using the Same Word as Different Parts of Speech - Editing **Materials:** Instructor Manual,Word power Made Easy Book,News Papers		6
Unit–2	**Oral Communication–Part3**	
Self-Introduction- Miming (BodyLanguage)- Introduction to the Sounds of English- Vowels, Diphthongs& Consonants, Introduction to Stress and Intonation - Extempore - News Paper and BookReview- Technical Paper Presentation. **Material:**Instructor Manual,News Papers		4
Unit–3	**Verbal Reasoning–Part1**	
Analogies-Alphabet Test-Theme Detection-FamilyTree-Blood Relations (Identifying relationships among group of people) - Coding & Decoding-Situation Reaction Test -Statement & Conclusions **Material:**Instructor Manual,Verbal Reasoning by R.S.Aggarwal		8
Unit–4	**Quantitative Aptitude –Part1**	
Problemon Ages- Percentages- Profit and Loss- Simple & Compound Interest-Averages- Ratio, Proportion **Material:**Instructor Manual, Aptitude Book		6
Unit–5	**QuantitativeAptitude –Part2**	
Speed,Time & Work and Distance-Pipes and Cisterns-Mixtures and Allegations- Races-Problem on Trains - Boats and Streams **Practices**:Puzzles,Sudoku,Series Completion,Problem on Numbers **Material:**Instructor Manual,Aptitude Book		6
	Total	**30**

EvaluationCriteria

S.No.	Particular	TestPortion	Marks
1	Evaluation1 - Written Test	15Questions EachfromUnit1,3,4&5(External Evaluation)	50
2	Evaluation2 - OralCommunication	Extempore&Miming–Unit 2 (ExternalEvaluationbyEnglish,MBADept.)	30
3	Evaluation3 - TechnicalPaper Presentation	InternalEvaluationbytheDept.	20
		Total	**100**

ReferenceBooks

1. Aggarwal,R.S."AModernApproachtoVerbalandNon-verbalReasoning",RevisedEdition2008,Reprint2009,S.Chand&CoLtd.,NewDelhi.
2. AbhijitGuha,"QuantitativeAptitude",TMH,3rd edition
3. ObjectiveInstantArithmeticbyM.B.Lal&GoswamiUpkarPublications.
4. WordPowerMadeEasybyNormanLewisW.R.GOYAL Publications

Note:

- InstructorcancoverthesyllabusbyClassroomactivitiesandAssignments(5Assignments/week)
- InstructorManualhasClassworkquestions,AssignmentquestionsandRoughworkpages
- EachAssignmenthas 20questionsfromUnit1,3,4andUnit5and5questionsfromUnit2.
- Evaluationhastobeconductedaslike LabExamination.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	1	1	1	1	1	3	2	3	1	1	1
CO2		1		1	1	1	1	1	2	3	2	3	1		1
CO3	1	1	1	1	2	3	1	1	2	3	2	3	1	1	1
CO4	3	2	2	2	1	2	1	1	2	3	2	3	2	2	2
CO5	3	2	2	2	1	2	1	1	2	3	2	3	2	2	2

K.S. Rangasamy College of Technology – Autonomous R2018							
50 IT 501 - Computer Networks							
IT							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

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Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Objective(s)	• 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
Course Outcomes	**At the end of the course, the students will be able to** CO1: Acquire Knowledge about basic network theory and layered communication architectures CO2: Recognize the different error control techniques in data link layer CO3: Attain solutions to various problems in network addressing and routing CO4: Explore the concepts of congestion control and flow control techniques CO5: Attain extensive knowledge on principles of application layer protocols.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction and Physical Layer

Introduction -Networks - Network Types – TCP/IP Protocol Suite - OSI Model – Digital-to-Digital conversion- Line Coding Schemes - Guided Transmission Media [9]

Data Link Layer

Error Detection and Correction – Introduction –Block coding –Cyclic Codes – CRC-Checksum –Forward Error Correction - Data Link Control –DLC services –Data link layer protocols –HDLC – Wired LANs- Ethernet (802.3)– Standard Ethernet - Wireless LANs - 802.11- Connecting Devices [9]

Network Layer

Network layer services –Circuit Switching - Packet Switching – Network layer performance- IPV4 Addresses –Address Space - Classful Addressing - Classless Addressing - Next Generation IP- IPv6 Addressing- IPv6 Protocol –Transition from IPv4 to IPv6 – Unicast Routing - Distance Vector Routing – Link State Routing – Multicast Routing – Multicast Distance Vector [9]

Transport Layer

Introduction -Transport Layer Protocols - User Datagram Protocol – Transmission Control Protocol – TCP Services-Features – Segment - TCP Connection -TCP congestion control – Data Compression - Quality of services (QOS) –Data Flow Characteristics - Flow control to improve 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”, 5th Edition, Tata McGraw Hill, 2013.
2. Behrouz A. Forouzan, “TCP/IP Protocol Suite”, 4thEdition, Tata McGraw Hill, 2015.

Reference(s) :

1. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach”, 5th Edition, Pearson Education, 2009.
2. Larry L.Peterson and Bruce S. Davie, “Computer Networks, A Systems Approach”, 4th Edition, The Morgan Kaufman Series in Networking, 2007.
3. Andrew S. Tanenbaum, “Computer Networks”, 4th Edition, PHI, 2003.
4. William Stallings, “Data and Computer Communication”, 8th Edition, Pearson Education, 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2								3	3	
CO2	3	3	3	2	2								3	3	
CO3	3	3	3	2	2								3	3	
CO4	3	3	3	2	2								3	3	
CO5	3	2	2	2	2								3	3	

K.S.Rangasamy College of Technology – Autonomous R2018							
52 IT 502 - Database Management Systems							
IT							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

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Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023 **BoS Chairman Signature**

Objective(s)	• To familiarize the students with various data models, relational algebra and SQL • To represent a database system using ER diagrams and to learn normalization techniques • To gain knowledge on data storage and querying concepts. • To expose the fundamentals of transaction processing, recovery concepts and aware of • the advanced databases. • To gain knowledge about the Distributed databases, NOSQL and database security
Course Outcomes	**At the end of the course, the students will be able to** CO1: Construct SQL Queries using relational algebra CO2: Design database using ER model and normalize the database. CO3: Apply various indexing and hashing strategies to retrieve the data efficiently. CO4: Analyze the properties of a transaction using various locking protocols. CO5: Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Relational Databases

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL [9]

Database Design

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form [9]

Data Storage and Querying

Overview of Physical Storage Media - RAID - File Organization - Organization of Records in Files – Index Structure for Files - Different types of Indexes- B^+-Tree – Hashing Techniques –Query Processing – Query Optimization. [9]

Transaction Management

Transaction – Transaction Concepts - Transaction Model - Desirable Properties of Transaction- Schedule and Recoverability- Serializability – Concurrency Control - Lock-Based Protocols - Two-Phase Locking Protocol - Timestamp-Based Protocols – Recovery System -Failure Classification - Storage - Recovery and Atomicity. [9]

Advanced Topics

Distributed Databases: Architecture, Data Storage, Transaction Processing, Query processing and optimization – NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases. Database Security: Security issues – Access control based on privileges – Role Based access control – SQL Injection – Statistical Database security – Flow control – Encryption and Public Key infrastructures – Challenges [9]

Total Hours 45

Text book(s):

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, “Database System Concepts”, 7th Edition, McGraw-Hill, 2020.
2. RamezElmasri and Shamkant B. Navathe, “Fundamental Database Systems”, 7th Edition, Pearson Education, 2017.

Reference(s):

1. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	3				2	2	2			2	
CO2	2	3	3	2	3				2	2	2	2	2	3	
CO3	2	2	3	3	3								2	3	
CO4	2	3	2	3	3								2		
CO5	2	3	3	3	3				2	2	2	2	2		

K.S.Rangasamy College of Technology - Autonomous R2018								
50 IT 503 – Programming using Python								
IT								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	2	60	4	50	50	100

Objective(s)	• To know basic programming in Python • To understand modules and handle exceptions • To learn object oriented programming concepts • To connect database and network through programming • To create layouts using graphical toolkits
Course Outcomes	**At the end of the course, the students will be able to** CO1: Apply the basics of Python programming for problem solving CO2: Implement object oriented programming concepts using Python CO3: Develop programs for handling files and exceptions CO4: Design layouts with GUI toolkits using Tkinter CO5: Deploy database management for implementing DB connectivity and expel network Programming

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction to Python – Data Types : List – Tuple – Dictionary – Set – Operators, Input and Output – Control statements – Arrays – Strings - Functions – Returning multiple values – Pass by object reference – Recursive function – Lambdas – Default arguments - Modules - Namespaces – Importing modules [9]

Object Oriented Programming

Object Oriented Programming – Class and Objects – Data Abstraction - Encapsulation – Inheritance – Polymorphism - Abstract Classes and Interfaces [9]

Exception and File Handling

Exceptions – Handling Exceptions - User Defined Exceptions – Files – Text file – Binary file – Zipping and unzipping - Working with Directories – Regular Expression – Threads – Creating Threads – Thread Class Methods – Thread Synchronization [9]

Graphical User Interface

Introduction to Tkinter – Creating GUI widgets – Resizing – Configuring widget options – Creating Layouts – Radio buttons – Check boxes – Dialog boxes – Drawing using Turtle [9]

Networking and Database Connectivity

Socket Programming – Client Server Program – Reading webpage source code , Downloading a webpage, image from internet - Creating database tables - Setting up a Database – Python database APIs [9]

Total Hours: 45+15(Practical) 60

Text book(s):

1. Dr. R.Nageswara Rao “Core Python Programming”, DreamTechPress,Second Edition,2018
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. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2							2	3	3	3
CO2	3	3	3	2	2							2	3	3	3
CO3	3	3	3	2	2							2	3	3	3
CO4	3	3	3	2	2							2	3	3	3
CO5	3	3	3	2	2							2	3	3	3

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BoS Chairman Signature

K.S. Rangasamy College of Technology – Autonomous R2018								
51 IT 5P1- Networking Laboratory								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	0	0	4	60	2	60	40	100
Objective(s)	• To acquire knowledge on various networking protocols • To learn the socket programming for client-server communication • To analyze and implement flow control mechanisms • To demonstrate the working of error control techniques • To design unicast and multicast routing algorithms							
Course Outcomes	At the end of the course, the students will be able to CO1: Acquirehands on experience on various networking protocols CO2: Implement socket programming for client-server communication CO3: Analyze and implement flow control mechanisms CO4: Implement error detection and correction techniques CO5: Implement unicast and multicast routing protocol							
LIST OF EXPERIMENTS								
1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine. 2. Write a code 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 bit stuffing 6. Implementation of parity checker 7. Simulation of error detection code 8. Simulation of error correction code 9. Simulation of transport layer Protocoland congestion control techniques 10. Performance evaluation of unicast / multicast routing protocol								

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3				2				3	3	
CO2	3	3	3	3	3				2				3	3	
CO3	3	3	3	3	3				2				3	3	
CO4	3	3	3	3	3				2				3	3	
CO5	3	3	3	3	3				2		3	3	3	3	

K.S. Rangasamy College of Technology – Autonomous R2018								
52 IT 5P2 - Database Management Systems Laboratory								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	0	0	4	60	2	60	40	100
Objective(s)	• 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							
Course Outcomes	**At the end of the course, the 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. CO2: Construct Sub queries, views and joins to retrieve data from multiple tables. CO3: Implement the database programming with Cursors, Triggers, Procedures and Functions in PL/SQL. CO4: Design and implement applications using ODBC. CO5: Create and manipulate data using My SQL and NOSQL database.							
LIST OF EXPERIMENTS								
1. Data Definition Language (DDL) commands in RDBMS.								

2. Data Manipulation Language (DML), Data Control Language (DCL) and Transaction Control Language (TCL) commands in RDBMS.
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. High level language extension with Triggers
9. Procedures and Functions.
10. Embedded SQL.
11. MySQL Simple Queries and Database Connectivity
12. MariaDB Simple Queries
13. Design and implement the following applications using ODBC. (Any 3)
    - Payroll Processing System
    - Banking System
    - Railway Reservation System
    - Inventory Control System
    - Online Retail System
    - Hospital Management System
    - Library Management System
    - Restaurant Management System
    - Blood Donation System
    - ATM System
14. Create Document, column and graph based data using NOSQL database.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	3				2	2	2			2	3
CO2	2	3	3	2	3				2	2	2	2	2	3	3
CO3	2	2	3	3	3								2	3	
CO4	2	3	2	3	3								2		3
CO5	2	3	3	3	3				2	2	2	2	2		3

K.S.Rangasamy College of Technology – Autonomous R2018							
50 TP 0P3 - Career Competency Development III							
Semester	Hours/Week			Credit	MaximumMarks		
	L	T	P	C	CA	ES	Total
V	0	0	2	0	100	00	100
Objective(s)	• To help the learners to enrich the written and oral communication skills in the academic and professional contexts • To help the learners to enrich their verbal and logical reasoning ability to meet out the employability requirements of the companies • To help the learners to comprehend the Intermediate level of aptitude skills required to attend placement and competitive online exams • To help the learners to enhance their knowledge in the quantitative aptitude skills in algebraic and linear equations. • To help the learners to augment the core technical and coding skills of their respective domains to compete in coding contests						
Course Outcomes	**At the end of the course, the student will be able to** CO1: Examine the written and oral communication skills in the academic and professional contexts CO2: Interpret the concepts of verbal reasoning and relate for the concepts to the requirements of the competitive exams and employability CO3: Infer the concepts of intermediate level of aptitude skills pertaining to competitive exams and company recruitments. CO4: Assess their comprehension in the quantitative aptitude skills in algebraic and linear equations. CO5: Review the core technical and coding skills of their respective domains to compete in						

	coding contests	
Unit–1	**WrittenandOralCommunication– Part1**	Hrs
Reading Comprehension Level 3 - Self Introduction - News Paper Review - Self Marketing - Debate-Structuredand Unstructured GDs Psychometric Assessment – Types & Strategies to answer the questions **Practices:**Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech-Interpretation of Pictorial Representations-Editing-GD-Debate. **Materials:**Instructor Manual, Wordpower Made Easy Book,NewsPapers		6
Unit–2	**Verbal&LogicalReasoning–Part1**	
Syllogism - Assertion and Reasons - Statements and Assumptions - Identifying Valid Inferences - identifyingStrongArgumentsandWeakArguments-StatementsandConclusions-CauseandEffect-DerivingConclusions from Passages - Seating Arrangements. **Practices:** Analogies - Blood Relations - Statement &Conclusions. **Materials:**InstructorManual, Verbal Reasoning by R.S.Aggarwal		8
Unit–3	**QuantitativeAptitude–Part3**	
Probability-Calendar-Clocks-Logarithms -Permutations and Combinations **Materials:**Instructor Manual,Aptitude Book		6
Unit–4	**QuantitativeAptitude–Part4**	
Algebra-LinearEquations-QuadraticEquations –Polynomials. **Practices:**ProblemonNumbers -Ages-Train-TimeandWork -Sudoku–Puzzles. **Materials:**Instructor Manual,Aptitude Book		6
Unit–5	**Technical&ProgrammingSkills–Part1**	
CoreSubject–1,23 **Practices:**Questionsfrom Gate Material. **Materials:**TextBook,GateMaterial		4
	Total	30

EvaluationCriteria

S.No.	Particular	TestPortion	Marks
1	Evaluation1WrittenTest	15Questions eachfrom Unit1,2,3,4&5(ExternalEvaluation)	50
2	Evaluation2-OralCommunication	GDandDebate (ExternalEvaluationbyEnglish,MBADept&ExternalTrainers)	30
3	Evaluation3–TechnicalPaperPresentation	InternalEvaluationbytheDept.	20
		Total	**100**

ReferenceBooks

1. Aggarwal,R.S."AModernApproachtoVerbalandNon-verbalReasoning",RevisedEdition2008,Reprint2009,S.Chand& Co Ltd., NewDelhi.
2. AbhijitGuha,"QuantitativeAptitude",TMH,3rd edition
3. ObjectiveInstantArithmeticbyM.B.Lal&GoswamiUpkarPublications.
4. WordPowerMadeEasybyNormanLewisW.R.GOYALPublications

Note:

- Instructorcancoverthesyllabusby Classroomactivitiesand Assignments(5Assignments/week)
- InstructorManualhasClassworkquestions,AssignmentquestionsandRoughworkpages
- EachAssignmenthas20QuestionsfromUnit1,2,3,4and5and5QuestionsfromUnit1
- Evaluationhastobeconductedaslike Lab Examination.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	1	2	3	2	3	1	1	1
CO2	2	1	2	2	1	2	1	1	2	3	3	3	1	1	1
CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2	2
CO4	2	1	2	2	1	1	1	1	2	3	2	3	2	2	2
CO5	2	2	2	2	2	2	2	2	2	3	2	3	3	3	3

K.S.Rangasamy College of Technology – Autonomous R2018							
51 IT 601 – Data Science							
IT							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VI	3	1	0	60	4	40	60	100

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Approved in Academic Council Meeting held on 03/06/2023 **BoS Chairman Signature**

Objective(s)	• To impart necessary knowledge needed for data science. • To gain knowledge on data preprocessing • To acquire knowledge on programming tools • To implement classification models. • To develop programming skills required to build data science applications.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Comprehend about big data characteristics and architecture. CO2: Demonstrate the tools needed for data science. CO3: Collect, explore, clean, and manipulate data. CO4: Implement models such as k-nearest Neighbors, Naive Bayes, linear regression, and decision trees. CO5: Build data science applications using Python based toolkits.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Data Science [9]
Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting

Introduction to Programming Tools for Data Science
Toolkits using Python: Matplotlib, NumPy, Pandas, Seaborn, Scikit-learn, NLTK [9]
Visualizing Data: Bar Charts, Line Charts, Scatterplots, Histograms-Box plot

Data Preprocessing
Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Data Preprocessing tools – Data Wrangling Tools - Manipulating Data, Rescaling, Dimensionality Reduction). [9]
Lab Exercise: Data Processing and Feature Engineering with MATLAB.

Machine Learning
Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression-model assumptions, regularization (lasso, ridge, elastic net), Classification algorithms- Naïve Bayes, K-Nearest Neighbors,support vector machines (SVM), decision trees, and random forest. [9]
Lab Exercise: Predictive Modeling and Machine Learning with MATLAB.

Case Studies of Data Science Application
Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis. [9]
Lab Exercise: Data Science Project: MATLAB for the Real World.

Total Hours: 45+15(Tutorial) 60

Text book(s)

1.	Joel Grus, "Data Science from Scratch: First Principles with Python", 2nd Edition, O'Reilly Media,2019
2.	AurélienGéron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media,2017

Reference(s):

1.	Jain V.K., “Data Sciences”, Khanna Publishing House, Delhi.
2.	Jain V.K., “Big Data and Hadoop”, Khanna Publishing House, Delhi.
3.	Jeeva Jose, “Machine Learning”, Khanna Publishing House, Delhi.
4.	Chopra Rajiv, “Machine Learning”, Khanna Publishing House, Delhi.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1								2				3	
CO2	3	3	2	3	3		3			2	3	3		3	2
CO3	3	2	2	3	3		3			2	3	3		3	2
CO4	3	1		2	2		3			1	3	2		3	2
CO5	3	2		2	3					2	3	3		3	

K.S.Rangasamy College of Technology – Autonomous R2018								
51 IT 602 - Web Technology								
IT								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100
Objective(s)	• To know various technologies are involved in designing a creative and dynamic website. • To develop the concepts of styling sheets • To understand the fundamentals of various Scripting languages. • To enhance the knowledge of how hierarchy of objects are used in HTML. • To demonstrate the fundamentals of AJAX							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Categorize the issues in designing a web page by utilizing XHTML components CO2: Understand the various styling sheets involved in web page. CO3: Incorporate JavaScript variables, operators and functions in web pages CO4: Create Web pages with dynamic styles and validate the HTML form data using Java Scripts. CO5: Optimize the performance of web page loading using AJAX with database connectivity							
Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.								
Introduction to Web Essentials Introduction – History of the Internet and WWW-W3C-Web Browser –Internet explorer &firefox-Customizing browser settings- Rich Internet Applications-web services-location based services-Editing XHTML-First XHTML Example - W3C XHTML Validation Service -Headings -Linking -Images - Special Characters and Horizontal Rules - Lists - Tables - Forms - Internal Linking – meta Elements-Frames								
Styling Sheets Cascading Style Sheets(CSS) - Introduction - Inline Styles - Embedded Style Sheets - Conflicting Styles - Linking External Style Sheets - Positioning Elements - Backgrounds - Element Dimensions - Box Model and Text Flow - Media Types - Building a CSS Drop-Down Menu - User Style Sheets.								
Client Side Programming Introduction - Simple Program- Obtaining User Input with prompt Dialogs - Memory Concepts - Arithmetic - Decision Making- Control Structures - Selection Statement - Repetition Statement - Program Modules in JavaScript – Programmer Defined Functions - Function Definitions - Random Number Generation - Examples - Scope Rules - JavaScript Global Functions - Recursion - Recursion vs. Iteration - Arrays - Examples – Reference and Reference Parameters - Passing Arrays to Functions - Sorting and Searching - Multidimensional Arrays								
JAVASCRIPT: Objects Introduction - Introduction to Object Technology - Math Object - Date Object - Boolean and Number Objects - Document Object - Window Object - Using Cookies - JavaScript Example - Using JSON to Represent Objects - DOM - Modeling a Document: DOM Nodes and Trees -Traversing and Modifying a DOM Tree -DOM Collections -Dynamic Styles - JavaScript Events - Registering Event Handlers -Event onload- Event onmousemove , Rollovers with onmouseover and onmouseout - Form Processing with onfocus, onblur-onsubmit and onreset - Event Bubbling.								
Web Servers Introduction - Traditional Web Applications vs. Ajax Applications - Rich Internet Applications (RIAs) with Ajax - “Raw” Ajax Example Using the XML Http Request Object - Web servers - HTTP Transactions - Multitier Application Architecture - Client-Side Scripting versus Server-Side Scripting Accessing Web Servers Microsoft Internet Information Services (IIS) - Apache HTTP Server - Requesting Documents –Ruby- Rails Frame work-Action controller and Action View-Case Study.								
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	Deitel & Deitel, “Internet and World Wide Web – How to Program”, 4th Edition, Pearson Education Asia, 2011.							

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		3	2		3	2			3	2	3	3
CO2	3	2	2		3	2		3	2		2	3	2	3	3
CO3	3	2	2	3	3		2	3	2		2	3	2	3	3
CO4	3	2	2	3	3		2	2	2	2	2	3	2	3	3
CO5	3	2	2		3			2	2			3	2	3	3

K.S. Rangasamy College of Technology – Autonomous R2018

50 IT 603 - Machine Learning

IT

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

Objective(s)

- 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

Course Outcomes

At the end of the course, the students will be able to

CO1: Distinguish between, supervised, unsupervised and semi -supervised learning

CO2: Apply the apt linear model for any given problem

CO3: Suggest supervised, unsupervised or semi-supervised learning algorithms for assessing the distance-based analysis

CO4: Design systems that use the appropriate tree and rule models of machine learning

CO5: Apply reinforcement learning strategy for real-time applications

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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 – learning curve [9]

Linear Models

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – going beyond linearity – 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 – ensemble learning – bagging and random forests – boosting – meta learning [9]

Tree and Rule Models

Decision trees – learning decision trees – ranking and probability estimation trees – regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rule learning [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

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) :

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BoS Chairman Signature

1.	T. M. Mitchell, “Machine Learning”, McGraw Hill, 1997.
2.	EthemAlpaydin, “Introduction to Machine Learning(Adaptive Computation and Machine Learning Series)”, 3rd Edition, MIT Press, 2014.
3.	D. Barber, “Bayesian Reasoning and Machine Learning”, Cambridge University Press, 2012.
4.	Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques",3rd Edition, Morgan Kaufmann Publishers,2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3				2	2	2			2	2
CO2	2	3	3	3	3				2	2	2	2	2	3	3
CO3	2	3	3	3	3								2	3	
CO4	2	3	3	3	3								2		3
CO5	2	3	3	3	3				2	2	2	2	2		3

K.S.Rangasamy College of Technology – Autonomous R2018

50 IT 604 – Software Testing

IT

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

Objective(s)

- To provide the basics of software testing and 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 in an organization.
- To understand the need and challenges in test automation.
- To develop testing scripts using different software tools.

Course Outcomes

At the end of the course, the students will be able to

CO1: Comprehend the insight of softwaretesting principles and various defect prevention strategies

CO2: Apply the concept of black box testing and white boxtesting approaches

CO3: Explore the various software testing techniques and apply multiple levels oftesting

CO4: Identify the role of a tester as an individual and as a teammember in test organization

CO5: Apply software testing for large projects using automated testingtools and grasp the techniques of Rational Testing Tools and Java Testing Tools

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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 – Alpha, Beta Tests. [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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3								3	3	
CO2	3	3	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	3	3							3	3	3	

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52 IT 6P1- Data Science Laboratory

IT

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100

Objective(s)

- To learn python libraries for data science
- To understand the basic Statistical and Probability measures for data science.
- To apply regression analytics on standard data sets
- To implement classification models.
- To develop programming skills required to build real world applications.

Course Outcomes

At the end of the course, the students will be able to

CO1: Make use of the python libraries for data science
CO2: Implement statistics measures and visualize the data using R
CO3: Implement regression algorithm to predict the model.
CO4: Implement classification techniques to predict the model
CO5: Implement data science techniques for social media data

LIST OF EXPERIMENTS

1. Write a Python program using Numpy arrays and Pandas data frames
2. Implement Naïve Bayes classification using Python
3. Implement k-Nearest Neighbours classification using Python
4. RAS CALCULATOR APPLICATION
   a. Using with and without R objects on console
   b. Using mathematical functions on console
   c. Write an R script, to create R objects for calculator application and save in a specified location in disk
5. VISUALIZATIONS
   a. Find the data distributions using box and scatter plot.
   b. Find the outliers using plot.
   c. Plot the histogram, bar chart and pie chart on sample data.
6. Develop a Python program for simple Linear Regression
7. Implementation of Naive Bayesian Classifier using Weka
8. Implementation of Decision Trees using Rapid Miner
9. Implementation of Support Vector Machine using Matlab
10. Implementation of Sentiment Analysis using google colab

SUGGESTED SOFTWARE TOOLS: R, RapidMiner, WEKA , MATLAB,ANACONDA-JUPITER,Google Colab

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3		3			2		3		3	2
CO2	3	3	3	3	3		3			2		3		3	2
CO3	3	2	3	3	3		3			2		3		3	2
CO4	3	1	3	2	2		3			1		2		3	1
CO5	3	2	3	2	3		3			2	3	3		3	1

K.S. Rangasamy College of Technology – Autonomous R2018								
50 IT 6P2 - Design Project								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	0	0	4	60	2	60	40	100
Objective(s)	• To develop an ability to design and implement static and dynamic website with good aesthetic sense of designing and latest technical know-how's. • To apply various web and scripting languages such as HTML, CSS, JavaScript. • To create user sessions and session management. • To design and develop a Website using good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services. • To gain the knowledge of publishing web site.							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Identify the problem and software requirements CO2: Analyze and apply the role of client side technologies like HTML, CSS,JS, PHP and protocols in the workings of the web and web applications CO3: Create web pages using HTML and Cascading Styles sheets. CO4: Demonstrate a program to create user sessions and session management. CO5: Upload/publish a web site to a domain named host web site location							

LIST OF EXPERIMENTS

Select a domain and follow the steps given below:

1. Identify the Problem.
2. Specify Software Requirements.
3. Make a Simple static web page using HTML Tags.
4. Apply Cascading Style Sheet and enhance the design of web pages.
5. Translate the static web page as dynamic web page with validation using JavaScript.
6. Identify appropriate server side technology that suits the web site design.
7. Design the website which accepts dynamic response from the user and process the user inputs with appropriate server side technology and database. Use any of the following concepts: User Sessions, Transaction Management, Sessions and session Management, Maintaining state information, Transaction Processing monitors – object Request Brokers, cryptography, Digital signature, Digital certificates, Security Socket Layer (SSL), Credit card Processing Models, Secure Electronic Transaction, and 3D Secure Protocol.
8. Deploy the developed system as a web service.

SUGGESTED WEB LANGUAGES:

HTML, XHTML, ASP.NET, JAVASCRIPT, PHP, PYTHON, etc.,

SUGGESTED WEB DEVELOPMENT TOOLS:

ECLIPSE, .NET FRAMEWORK, etc.,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2			2							3		
CO2	3	2	2				2		3					3	
CO3	3	2	2							2		2			3
CO4	3	2	2	2				2			1				
CO5	3	2	2		2										

K.S.Rangasamy College of Technology – Autonomous R2018							
50 TP 0P4 - Career CompetencyDevelopment IV							
Semester	Hours/Week			Credit	MaximumMarks		
	L	T	P	C	CA	ES	Total
VI	0	0	2	0	100	00	100
Objective(s)	• To help the learners to enrich the advanced written and oral communication skills in the academic and professional contexts						

	• To help the learners to augment their advanced verbal and logical reasoning ability to meet out the employability requirements of the companies • To help the learners to comprehend the advanced level of aptitude skills in the concepts of Geometry • To help the learners to enhance the data interpretation and analytical skills in varied methods. • To help the learners to enrich the technical and programming skills to be focused on better employability, codeathons and hackathons
Course Outcomes	**At the end of the course, the student will be able to** CO1: Examine and correlate the written and oral communication skills in the academic and professional contexts CO2:Predict and discriminate advanced verbal and logical reasoning ability to meet out the employability requirements of the companies CO3:Infer the concepts of advanced level of aptitude skills on Geometry pertaining to competitive exams and company recruitments. CO4:Illustrate the data interpretation and analytical skills in varied methods. CO5:Formulate the technical and programming skills to be focused on better employability, codeathons and hackathons

Unit–1	**WrittenandOralCommunication– Part2**	Hrs
Self-Introduction–GD–PersonalInterviewSkills **Practices** on Reading Comprehension Level 2 – Paragraph Writing – Newspaper and Book Review Writing –SkimmingandScanning–InterpretationofPictorialRepresentations–SentenceCompletion-SentenceCorrection–JumbledSentences–Synonyms&Antonyms–UsingtheSameWordasDifferentPartsofSpeech –Editing.**Materials:**InstructorManual,WordpowerMadeEasyBook,NewsPapers		4
Unit–2	**Verbal&LogicalReasoning –Part2**	8
Analogies – Blood Relations – Seating Arrangements – Syllogism – Statements and Conclusions, Cause andEffect – Deriving Conclusions from Passages – Series Completion (Numbers, Alphabets & Figures) – AnalyticalReasoning–Classification–CriticalReasoning**Practices**:Analogies–BloodRelations–Statement&Conclusions.**Materials:**InstructorManual, VerbalReasoningbyR.S.Aggarwal		
Unit–3	**QuantitativeAptitude– Part–5**	6
Geometry–StraightLine–Triangles–Quadrilaterals–Circles–Co-ordinateGeometry–Cube–Cone –Sphere.**Materials:**InstructorManual,Aptitudebook		
Unit–4	**DataInterpretationandAnalysis**	6
DataInterpretationbasedonText–DataInterpretationbasedonGraphsandTables.GraphscanbeColumnGraphs, BarGraphs, LineCharts,PieChart,GraphsrepresentingArea,VennDiagram&FlowCharts.**Materials:** InstructorManual,AptitudeBook		
Unit–5	**Technical&ProgrammingSkills–Part2**	6
CoreSubject– 4,5,6**Practices:**QuestionsfromGateMaterial.**Materials:**TextBook,GateMaterial		
	Total	30

EvaluationCriteria

S.No.	Particular	TestPortion	Marks
1	Evaluation1WrittenTest	15Questions eachfrom Unit1,2,3,4&5(ExternalEvaluation)	50
2	Evaluation2–OralCommunication	GDandHRInterview (ExternalEvaluationbyEnglish,MBADept.)	30
3	Evaluation 3 – TechnicalInterview	InternalEvaluationbytheDept.–3CoreSubjects	20
		Total	100

ReferenceBooks

1. Aggarwal,R.S."AModernApproachtoVerbalandNon-verbalReasoning",RevisedEdition2008,Reprint2009,S.Chand& Co Ltd., NewDelhi.
2. AbhijitGuha,"QuantitativeAptitude",TMH,3rd edition
3. ObjectiveInstantArithmeticbyM.B.Lal&GoswamiUpkarPublications.
4. WordPowerMadeEasybyNormanLewisW.R.GOYALPublications

Note:

- Instructorcancoverthesyllabusby Classroomactivitiesand Assignments(5Assignments/week)
- InstructorManualhasClassworkquestions,AssignmentquestionsandRoughWorkpages
- Each Assignment has 20 questions from Unit 1,2,3,4,5 and 5 questions from Unit 1(OralCommunication)& Unit 5(Programs)
- Evaluationhastobeconductedaslike Lab Examination.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	2	1	1	2	3	2	3	1	2	2
CO2	2	1	2	2	1	2	1	1	2	3	3	3	2	1	1
CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2	2
CO4	2	2	2	2	2	1	1	1	2	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	3	2	3	3	3	3

K.S.RangasamyCollegeof Technology– Autonomous R2018

50 HS 001 - Engineering Economics and Financial Accounting

Common to all Branches

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

Objective(s)

- To make the Engineering student to know about the basic of economics & how to organize a business
- To know the financial aspects related to business.
- To know about functions of banks.
- To understand the different methods of appraisal of projects and
- To know about the pricing and capital techniques.

Course Outcomes

At the end of the course, the student will be able to

CO1: Identify suitable demand forecasting techniques and prevailing market structure.
CO2: Describe the forms of business and differentiate between proprietorship and partnership.
CO3: Explain the kinds of banks and illustrate the Balance sheet with suitable example.
CO4: Interpret fixed cost and variable cost and technical feasibility and economic feasibility.
CO5: Apply break even analysis and summarize the managerial uses of break even analysis.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Basic Economics

Definition of economics – nature and scope of economics – basic concepts of economics – factors of production – demand analysis – 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 – proprietorship – partnership - joint stock company - cooperative organization – state Enterprise - mixed economy - Money and banking – kinds of banking - commercial banks - central banking functions - control of credit - monetary policy - credit instrument – Types of financing - Short term borrowing - Long term borrowing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations. [9]

Financial Accounting and Capital Budgeting

The balance Sheet and related concepts – The profit and loss statement and related concepts – Financial ratio analysis – Cash flow analysis – fund flow analysis – Capital budgeting– Average rate of return – Payback period – Net present value 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 – appraising project profitability - cost benefit analysis – feasibility reports – appraisal process – technical feasibility - economic feasibility – financial feasibility. [9]

Break Even Analysis

Basic assumptions –break even chart – managerial uses of break even analysis - applications of break even analysis in engineering projects. [9]

Total Hours 45

Textbook(s):

1. Khan MY and Jain PK, “Financial Management”, McGraw - Hill Publishing Co., Ltd., 3rdEdition,New York, 2017.
2. Varshney RL and Maheshwary KL, “Managerial Economics”, S Chand and Co., 22nd New Delhi, 2014.

Reference(s):

1. Samuelson P.A, "Economics - An Introductory" Text Book, New Age Publications ,New Delhi,2009
2. S.K.Bhattacharyya , John Deardon and Y.K.Koppikar, Accounting for Management Text and Cases".

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Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

3.	Barthwal R.R., " Industrial Economics - An Introductory" Text Book, New Age Publications,New Delhi,2010
4.	V.L.Mote,Samuel and G.S.Gupta,"Managerial Economics - Concepts and Cases", Tata Mcgraw Hill,2011

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	2	3	2	3	1	2	1	3	3	1
CO2	3	2	3	1	1	2	1	1	3	2	3	2	2	2	2
CO3	2	1	2	1	2	3	3	1	1	3	2	1	2	3	1
CO4	3	2	3	3	2	2	1	2	2	1	3	2	3	2	2
CO5	2	1	3	1	1	3	2	1	2	2	3	1	2	2	2

K.S.RangasamyCollegeof Technology– Autonomous R2018

50 IT 701 - Mobile Communication

IT

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

Objective(s)

- To learn the basics of wireless technologies supporting voice and data communication.
- To know various Cellular and Satellite Networks.
- To study the operation of wireless LAN, Wireless MAN and its standards.
- To know about various Mobile Routing Algorithms.
- To learn about Wireless Application Protocols.

Course Outcomes

At the end of the course, the students will be able to

CO1:Acquire the basics of mobile telecommunication system
CO2:Categorize generations of telecommunication systems in wireless network
CO3:Analyze the architecture of Wireless LAN technologies
CO4:Identify the functionality of network layer and the routing protocol for a given wireless networks
CO5:Explore the functionality of Transport and Application layer.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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 –WiFi–Introduction-HIPERLAN 1 –Blue Tooth-Broad Band Technologies–WiMAX–Protocol Architecture–Long Term Evolution Advanced [9]

Mobile Network Layer

Mobile IP –Dynamic Host Configuration Protocol –Routing –DSDV –DSR –Least Interference Routing– Hierarchical–Geographic Position Assisted Ad Hoc Routing [9]

Transport and Application layers

Traditional TCP –Classical TCP improvements – Mobile TCP–WAP –Architecture –WDP –WTLS –WTP WSP –WAE –WTA Architecture –WML [9]

Total Hours 45

Textbook(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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3		2							3		
CO2	3	3	1				2		1					3	
CO3	3	1	2	2		3	3		2	1		2		3	
CO4	3	2	2	2			2	2	2		3			2	3
CO5	3	2	2	2	2		2	2			2			2	2

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50 IT 702 - Cloud Computing

IT

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

Objective(s)

- To understand the fundamental concepts of cloud computing
- To recognize how to design and implement cloud-based applications.
- To learn about services provided by cloud such as Platform, infrastructure
- To know cloud security, services and storage
- To aware of cloud recent improvements

Course Outcomes

At the end of the course, the students will be able to

CO1: Explore Cloud basics with its architecture
CO2: Know cloud services and virtualization techniques implementation
CO3: Comprehend Amazon web services with Platform as a Service
CO4: Understand Cloud services like Windows Azure along with Cloud security
CO5: Explore tools for cloud environment and cloud advancements

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction to Open source – Open source tools - Cloud computing basics: Defining Cloud computing – Cloud Types - Characteristics of Cloud computing – Assessing the role of Open Standards - Measuring the cloud's value - Cloud Architecture: Exploring the cloud computing stack. [9]

Cloud Services and Applications

Understanding Services and Applications by Type: Defining Infrastructure as a service- Defining Platform as a Service- Defining software as a Service – Defining Identity as a Service, Understanding Abstraction and virtualization: Virtualization Technologies – Load Balancing and virtualization- Understanding Hypervisors- Machine Imaging – Porting applications [9]

Cloud Platforms

Platform as a Service: PaaS Applications Frameworks – Using Amazon Web Services: Amazon Web service components and Services – Working with Elastic Compute Cloud (EC2) – Working with Amazon Storage systems- Understanding Amazon Database Services [9]

Cloud Services and Security

Microsoft Cloud Services: Exploring Microsoft Cloud services – Windows Azure Platform, Cloud Security: Securing the cloud – Securing Data –Establishing Identity and Presence [9]

Cloud Technologies and Advancements

Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines - Hadoop – MapReduce – Virtual Box — Google App Engine – Amazon Web Services : AWS Compute, Storage, and Networking, AWS Security, Identity, and Access Management, AWS Database Options, AWS Elasticity and Management Tools [9]

Total Hours 45

Textbook(s):

1. Barrie Sosinsky, "Cloud Computing Bible". Wiley Publishing, 2011.
2. Lizhe Wang, Rajiv Ranjan, Jinjun Chen, BoualemBentallah, " Cloud Computing : Methodology, Systems and Applications" , CRC Press, 2017

Reference(s):

1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs". Emereo Pty Limited, 2008.
2. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud". 1st Edition Publisher - Orelly's, 2009
3. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", 1st Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.
4. Ronald Krutz and Russell Dean Vines , " Cloud Security" , Wiley - India, 2010

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			2	2								3	2	
CO2	3	2		2	2								3	2	
CO3	3		3	2	3	2	2						3	3	
CO4	2	3	3	2	3			2					3	3	
CO5	2	2	3	2	3	2		2					3	2	

K.S.RangasamyCollegeof Technology– Autonomous R2018

50 IT 703 - Cryptography and Network Security

IT

Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	3	1	0	60	4	40	60	100

Objective(s)

- To understand the principles of encryption algorithms and application level security mechanis
- 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.

Course Outcomes

At the end of the course, the 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.
CO2:Analyze the knowledge about the confidentiality factors and encryption techniques.
CO3:Know the authentication and confidentiality hash function and to expel the third party penetration in a mail transfer between two parties.
CO4:Recognize the authentication application and Internet security.
CO5:Identify various kinds of intruders and virus and learn about the firewall principles and techniques

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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 – DiffieHellman 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 over view– IP security policy. [9]

System Security

Intrusion detection – password management – Viruses and related Threats – Virus counter measures – Firewall design principles – Trusted systems. [9]

Total Hours Total Hours: 45+15(Tutorial) 60

Textbook(s):

1. William Stallings, “Cryptography And Network Security – Principles and Practices”, 8th Edition, Prentice Hall of India, 2020.
2. Behrouz A. Forouzen, DabdeepMukhopadhya, “Cryptography and Network Security”, Tata McGraw-Hill, 2012.

Reference(s):

1. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill,2006
2. William Stallings, “Cryptography And Network Security – Principles and Practices”, Prentice Hall of India, 4th Edition, 2008.
3. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with coding theory”, 2nd edition, Pearson Education, 2006.
4. Douglas R. Stinson, “Introduction to Modern Cryptography, 2nd Edition,CRC Press Taylor and francis Group, 2015.

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Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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	

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50 AC 001 – Research Skill Developmet - I

Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	1	0	0	15	0	100	0	100

Objective(s)

- To learn about the effective usage of powerpoint presentation
- To prepare presentation with various effects
- To visualize the data in the presentation
- To acquire knowledge about data sources
- To investigate the research articles based on various applications

Course Outcomes

At the end of the course, the students will be able to

CO1: Develop presentation with visual effects
CO2: Prepare a presentation with supporting data
CO3: Attain the importance of research and data collection
CO4: Analyze the various sources of research articles
CO5: Interpret the tools and methods in preparing manuscript

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus**.**

Preparing a Presentation Presenting data using Power Point- Power Point preparation and presentation, Design principles for creating effective PowerPoint slides with visuals displaying data. - Profile, - Problem, and a set of basic Excel charts, use to create a presentation.	[3]
Creating effective slides using PowerPoint Create effective lides using PowerPoint. Tools within Power Point, structure story line, create story boards, identify primary elements of slide design, display data and finalize slide presentation.	[4]
Research Designs and Data Sources Overview of the topics: process of data collection and analysis. Starting with a research question - Review of existing data sources- Survey data collection techniques- Importance of data collection- Basic features affect data analysis when dealing with sample data. Issues of data access and resources for access.	[4]
Measurements and Analysis Plan Importance of well-specified research question and analysis plan: various data collection strategies - Variety of available modes for data collection – review of literature - Tools at hand for simple analysis and interpretation.	[4]
Total Hours	**15**

Text Book(s):

1. Judy Jones Tisdale. Effective Business Presentations. Gulf Coast Books LLC. ISBN-13: 978-0130977359, 2004.
2. FraukeKreuter. Framework for Data Collection and Analysis,2018. https://www.coursera.org/learn/data-collection-framework

Reference(s)

1. Kothari, C.R. andGaurav Garg, “Research Methodology: Methods and Techniques”, New Age International Publishers, 2013
2. Srivastava, T.N. and Rego, S., "Business Research Methodology", Tata McGrawHill Education Pvt. Ltd., Delhi, 2019.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		3	2				2	3	3			3	1
CO2	3	3	1	2	2		2		2	3	2	1		3	2
CO3	3	3	2	2			2		1	3		1	3	3	
CO4	3	3	3	2		2	1	2		3	2	2	3	2	
CO5	3	3	2	2		2	1		2	3	2	2	3	2	

K.S.RangasamyCollegeof Technology– Autonomous R2018								
50 IT 7P1 – Cloud Computing Laboratory								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	60	40	100
Objective(s)	• To familiarize Cloud environment toolkit • To learn to run Virtual machines • To work with different services provided by Cloud • To know the installation of Hadoop • To develop and deploy analytical algorithms as Map / Reduce tasks							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Understand cloud computing environment CO2:Create VM and run applications in VMware CO3: Implement cloud services such as IaaS, SaaS CO4: Install Hadoop CO5:Develop an application using Hadoop tool							
LIST OF EXPERIMENTS								
1. Study of NIST model in Cloud Computing 2. Creation of Virtual Machine and installing applications in VM 3. Configure IaaS architecture for installing guest operating system using Eucalyptus. 4. Configure IaaS architecture in Eucalyptus for installing multiple operating systems in same host machine 5. Explore Storage as a Service for remote file access using web interface. 6. Installation and Configuration of Hadoop. 7. Create an application (Ex: Word Count) using Hadoop Map/Reduce. 8. Case study on Facebook or Google App engine (PaaS)								

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3		3								3	3	
CO2		3			3								3	3	
CO3		3			3								3	3	
CO4			3	2	3								3	3	
CO5			3	2	3								3	3	

K.S.RangasamyCollegeof Technology– Autonomous R2018								
50 IT 7P2 - Project Work - Phase I								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	0	0	4	60	2	100	00	100
Objective(s)	• 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, a conference proceedings relevant to their project work • To design an innovative project work • To implement the project with the recent IT tools							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Identify engineering problems relevant to the domain and perform related literature survey CO2: Analyze 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							

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.	
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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

K.S.Rangasamy College of Technology– Autonomous R2018							
50 TP 0P5 – Career Competency Development V							
Semester	**Hours/Week**			**Credit**	**MaximumMarks**		
	L	**T**	**P**	**C**	**CA**	**ES**	**Total**
VII	**0**	**0**	**2**	**0**	**100**	**00**	**100**

Objective(s)	• To help the learners to practice the written and oral communication skills in the academic and professional contexts • To help the learners to practice the verbal and logical reasoning ability to meet out the requirements of both competitive exams and companies • To help the learners to practice effectively the aptitude modules for company based recruitments and competitive exams • To help the learners to practice effectively the data interpretation and analysis modules for company based recruitments and competitive exams • To help the learners to hone the technical and programming skills for better employability
Course Outcomes	**At the end of the course, the student will be able to** CO1:Reinforce the written and oral communication skills in the academic and professional contexts CO2:Discriminate and assess the verbal and logical reasoning ability to meet out the employability requirements of the companies CO3:Relate the aptitude modules for company based recruitments and competitive exams effectively CO4:Compare and illustrate the data interpretation and analysis modules effectively for company based recruitments and competitive exams CO5:Formulate and integrate the technical and programming skills to be focused on better employability and code contests.

Unit–1	**Written and Oral Communication**	Hrs
Self-Introduction–GD–HR Interview Skills–Corporate Profile Review-Practices on Company Based Questions and Competitive Exams **Materials:**Instructor Manual		6
Unit–2	**Verbal & Logical Reasoning**	6
Practiceson Company Based Questions and Competitive Exams **Materials:**Instructor Manual		
Unit–3	**Quantitative Aptitude**	6
Practices on Company Based Questions and Competitive Exams **Materials:**Instructor Manual		

Unit–4	**Data Interpretation and Analysis**	6
Practices on Company Based Questions and Competitive Exams **Materials:**Instructor Manual		
Unit–5	**Programming & Technical Skills–Part3**	6
DataStructure- Arrays–LinkedList–Stack–Queues –Tree–Graph. Practices on Algorithms and Objective Type Questions. **Materials:**Instructor Manual		
	Total	30

EvaluationCriteria

S.No.	Particular	Test Portion	Marks
1	Evaluation1 - WrittenTest	15Questions eachfromUnit1,2,3,4&5 (ExternalEvaluation)	50
2	Evaluation2- OralCommunication	GDandHRInterview (ExternalEvaluationbyEnglish,MBADept.)	30
3	Evaluation3– TechnicalInterview	InternalEvaluationbytheDept.–3 Core Subjects	20
		Total	**100**

ReferenceBooks

1. Aggarwal,R.S."AModernApproachtoVerbalandNon-verbalReasoning",RevisedEdition2008,Reprint2009,S.Chand&CoLtd.,NewDelhi.
2. AbhijitGuha,"QuantitativeAptitude",TMH,3rd edition
3. ObjectiveInstantArithmeticbyM.B.Lal&GoswamiUpkarPublications.
4. WordPowerMadeEasybyNormanLewisW.R.GOYAL Publications

Note:

- InstructorcancoverthesyllabusbyClassroomactivitiesandAssignments(5Assignments/week)
- InstructorManualhasClassworkquestions,AssignmentquestionsandRoughwork pages
- EachAssignmenthas 20questionsforUnit 1,2,3,4&5andUnit5and5questionsfromUnit5(Algorithms)&Unit 1(OralCommunication)
- Evaluationhastobeconductedaslike LabExamination.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	2	1	1	2	3	2	3	1	2	2
CO2	2	1	2	2	1	2	1	1	2	3	3	3	2	1	1
CO3	2	1	2	2	1	1	1	1	2	3	2	3	2	2	2
CO4	2	2	2	2	2	1	1	1	2	3	3	3	3	2	2
CO5	2	2	2	2	2	2	2	2	2	3	2	3	3	3	3

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50 AC 002 - Research Skill Developmet - II

Semester	Hours / Week			Total Hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	1	0	0	15	0	100	-	100

Objective(s)	• To identify the ethics in preparing research paper • To organize manuscript for submission • To attain knowledge for filing Patent • To apply for copy right • To develop and deploy Mobile App. in play store
Course Outcomes	**At the end of the course, the students will be able to** CO1: Prepare a manuscript for journal publication. CO2: Apply the manuscript for publication CO3: Interpret the process of obtaining copyright and patent CO4: Analyze the various provisions to share the application CO5: Create and publish the mobile application in the digital store

Note: Hours notified against each unit in the syllabus are only indicative but are not decisive. Faculty may decide the number of hours for each unit depending upon the concepts and depth. Questions need not be asked based on the number of hours notified against each unit in the syllabus.

Preparation of Manuscript

[3]

Data necessary before writing a paper: the context in which the scientist is publishing. Learning and identification of research community - advantages of scientific journal publication and manuscript preparation - ethical values in publishing. **Writing the paper** Writing research paper - structure of the paper - usage of bibliographical tools - abstract preparation and to do a peer review for the abstract of the others, as in real academic life. Plagiarism of the prepared manuscript. [2] **Copyright** Copyright law in India-Meaning of copyright-Classes of works for copyright protection -Ownership of Copyright-Assignment of copyright-Intellectual Property Rights (IPR) of Computer Software-Copyright Infringements-Procedure for registration [2] **Patents** Patent System In India -Types of Patent Applications-patentable invention - Not patentable-Appropriate office for filing -Documents required Publication and Examination of Patent Applications -Grant of Patent-Infringement of Patents -E-filing of Patent applications [3] **Deploying Mobile App. in play store** Introduction to Application Stores – Play Store, App Store, Microsoft Store, Creating App – Android, iOS, UWP, Defining Manifest, Certifying App, Create Store Listing, Sharing Screenshots, Sharing App Credentials for Testing. [5]	
Total Hours	**15**
Text Book(s):	
1.	Mathis Plapp. How to Write and Publish a Scientific Paper (Project-Centered Course). https://www.coursera.org /learn/how-to-write-a-scientific-paper#instructors
2.	Rajkumar S. Adukia ,Handbook On Intellectual Property Rights In India,2007
3.	Dr. M. Kantha Babu ,"Text book on Intellectual Property Rights",2019.
Reference(s)	
1.	Kothari, C.R. and Gaurav Garg, "Research Methodology: Methods and Techniques", New Age International Publishers, 2013
2.	Srivastava, T.N. and Rego, S., "Business Research Methodology", Tata McGrawHill Education Pvt. Ltd., Delhi, 2019.
3.	https://support.google.com/googleplay/android-developer/answer/9859152
4.	https://developer.apple.com/ios/submit/
5.	https://docs.microsoft.com/en-us/windows/uwp/publish/app-submissions

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3				3		2	3	1		3	1
CO2	3	3	3	3			1	2	2	2	2	1		3	2
CO3	3	3	2	2	2		2	2	1	2	1	1	3	3	
CO4	3	3	3		3	2	2		2		2	2	3	2	
CO5	3	3	3		3	2	2		2		2	2	3	2	

K.S.RangasamyCollegeof Technology– Autonomous R2018								
50 IT 8P1 - Project Work - Phase II								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	0	0	16	240	8	60	40	100
Objective(s)	• 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							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Identify engineering problems relevant to the domain and carry out a literature survey for its support CO2: Apply algorithm and design techniques in the project and experience their outcome in their own real time project scenario CO3: Do experiment / simulate / program / fabricate, collect and interpret data CO4: Document the results in the form of technical report / presentation CO5: Develop the management skills to achieve the project goal by working as a team and demonstrate the technical skills acquire to provide feasible solution for real-life problems							

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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

K.S.Rangasamy College of Technology – Autonomous R2018

51 IT E11 / 50 IT L13 – C# and .NET Framework

IT

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

Objective(s)

- 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 skills in writing Windows applications and ADO.NET
- To learn web based applications on .NET

Course Outcomes

At the end of the course, the students will be able to

CO1: Analyze the basic structure of a C# application

CO2: Develop C# programs which makes use of inheritance, polymorphism, interfaces and handle exceptions

CO3: Design windows application and access data with ADO.NET

CO4: Apply the knowledge of data binding to create Web forms and obtain knowledge of Web services

CO5: Discuss about assemblies ,versioning and explore the activities of marshalling and Remoting

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to C# [9]

Introducing C# - Overview of C# - Literals, Variables and Data Types - Operators and Expressions - Branching and Looping - Methods - Arrays - Strings - Structures and Enumerations.

Object Oriented Aspects of C# [9]

Classes and Objects - Inheritance and Polymorphism - Interfaces - Operator Overloading - Delegates and Events - Errors and Exceptions.

Window Based Application Development on .NET [9]

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.

Web Based Application Development on .NET [9]
Understanding Web Forms - Creating a Web Forms - Adding Controls - Data Binding - Web Services - SOAP, WSDL and Discovery - Building a Web Service - Creating the Proxy - Session and Cache management.

The CLR and the .NET Framework
Assemblies and Versioning - PE Files, Metadata, Security Boundary, Manifests and Assemblies - Attributes and Reflection - Marshaling and Remoting [9]

Total Hours 45

Text book(s):

1.	E. Balagurusamy, "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 Schildt, "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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	3				1	1			2	2	
CO2	1	2	3	3	3				1	1			2	2	
CO3	1	2	2	2	2				1	3	3		2	2	
CO4	1	2	2	2	2				2	3	3		2	2	
CO5	1	2	2	2	2				2	3	3		2	2	

K.S.Rangasamy College of Technology – Autonomous R2018

50 IT E12 – User Interface Design

IT

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

Objective(s)

- To explore the knowledge of computer interface and user interface.
- To discover the concept of menus, windows, interfaces
- To increase the knowledge about business functions, study the testing methods
- To enhance the various controls for the windows
- To recognize various problems in windows design with color, text, graphics

Course Outcomes

At the end of the course, the students will be able to
CO1: Familiar with the importance of good design in user interface .
CO2: Identify the human characteristics in user interface design and make out the principles of good screen design
CO3: Classify the types of menus and handling principles
CO4: Recognize characteristics of device based control and screen based control
CO5: Design multimedia systems like graphics, icons, images, colors based on effective feedback.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction
Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles [9]

Design Process
User interface design process- obstacles-usability-human characteristics in design - Human interaction speed business functions- Requirement analysis-Direct-Indirect methods- Basic business functions- Design standard system timings - Human consideration in screen design [9]

System Menus And Navigation Schemes
Structures of Menus - Functions of Menus- Contents of Menu- Formatting - phrasing the Menu - Selecting Menu choice- Navigating Menus- Graphical Menus [9]

Controls Windows: Characteristics- Components- Presentation Styles-types-managements-organizations-operationsWeb systems- Device-based controls: characteristics- Screen-based controls: Operate control - Text boxesSelection control- Combination control- Custom control- Presentation control.	[9]
Windows Layout and Test Text for Web Pages - Effective feedback-guidance & assistance-Internationalization-Accessibility -Icons-ImageMultimedia -Coloring Windows Layout- Test: prototypes - kinds of Tests – Retest-Case studies	[9]
Total Hours	**45**
Text book(s):	
1. Wilbent. O. Galitz ,"The Essential Guide to User Interface Design", 2nd Edition, John Wiley& Sons, Reprint ,2007.	
2. Ben Sheiderman, "Design The User Interface", Pearson Education, 3rd Edition,1998.	
Reference(s):	
1. Alan Dix et al, " Human - Computer Interaction ", Prentice Hall, 1993.	
2. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002.	
3. Shneiderman, Ben, and Catherine Plaisant , "Designing the User Interface: Strategies for Effective Human-Computer Interaction",4th Edition, .Addison Wesley, 2004	
4. Soren laeusen, "User Interface Design: A Software Engineering Perspective",2012.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	3			2						
CO2	3	2	3	2	2	3	2	2	2	3			2		
CO3	3	2	3	2	2	3					2		2	2	
CO4	3	2	3	2	2	3		2							
CO5	3	2	3	2	2	3	2	2	2	3	2	1	2	2	

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50 IT E13 - Mathematical Foundations of Data Science

IT

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

Objective(s)

- To introduce the concepts of linear algebra in the fields of communication systems and signal processing.
- To enrich the skills in various numerical models.
- To understand the concept of random process and its application arise in sciences and engineering fields.
- To expose the knowledge of modeling the real life problems as linear programming problems and optimization.
- To impart the knowledge and application of non linear programming problems.

Course Outcomes

At the end of the course, the students will be able to

CO1: Apply the concepts of linear transformation and vectors spaces to solve real world applications.
CO2: Apply numerical technique to solve linear algebraic equations.
CO3: Apply the stationary, ergodic and Markovian processes to solve machine learning problems .
CO4: Apply different linear techniques to evaluate linear programming problems.
CO5: Apply different non-linear techniques to evaluate non-linear programming problems.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Linear Algebra [9]

Linear Algebra Row reduction and Echelon forms – Vector equations – Linear combinations of vectors – Linear independence - Introduction to linear transformation – Matrix of a linear transformation – Transformation from Rn toRm– Vector spaces and subspaces – Null spaces – Row and column spaces.

Linear Algebraic Equation and Eigen Value Problems System of equations- Solution by Gauss Elimination, Gauss-Jordan and LU decomposition method- Jacobi, Gauss-Seidal iteration method- Eigen values of a matrix by Jacobi and Power method.	[9]
Classification of Random Processes Definitions and examples of first order, second order, strictly stationary, wide-sense stationary and ergodic processes – Markov process – Binomial and Poisson process – Sine wave process.	[9]
Linear Programming Simplex algorithm – Two-phase and Big–M method –Transportation and Assignment problems	[9]
Non - Linear Programming Formulation of non-linear programming – Constrained optimization with equality constraints - Constrained optimization with inequality constraints – Saddle point problem – Graphical method of non-linear programming problem involving only two variables – Kuhn-tucker conditions with non-negative constraints	[9]
Total Hours	**45**

Text book(s):	
1.	B.S. Grewal, "Higher Engineering Mathematics", 43rdEdition, Khanna Publishers, Delhi, 2014.
2.	David C. Lay, 'Linear Algebra and its Applications', 5th Edition, Pearson Education, 2014.
Reference(s) :	
1.	Kreyszig Erwin, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Limited, New Delhi, 2016.
2.	T.Veerarajan. "Probability,Statistics and Random Processes",ThirdEdition,Tata McGraw Hill Education Private Limited Co., New Delhi, 2010.
3.	P.K.Kanthiswarup,Manmohan Gupta "Operations Research", S.Chand& Co., 1999.
4.	P.Kandasamy ,K.Thilagavathy and K.Gunavathy " Numerical Methods "S.Chand Limited., 2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	3				2				1	1	
CO2	2	2	2	2	3				2	2	2				
CO3	2	2	2	2	3					2	2		1	1	
CO4	2				3				2	2	2		1	2	
CO5	2				3				2						

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51 IT E14 - Computer Graphics and Multimedia

IT

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

Objective(s)	• To know various primitives and drawing algorithms • To understand 2D and 3D geometric objects • To understand various color models and graphics programming • To study basics of multimedia and various files supporting multimedia • To understand multimedia database structure
Course Outcomes	**At the end of the course, the students will be able to** CO1: Comprehend the basics of line ,circle and ellipse generating algorithms and different attributes and color levels CO2: Understand the 2D transformations and viewing the objects in various 2D Translation and clipping algorithms CO3: Understand the 3D geometric modeling and viewing the objects and Explicate the various color models and graphics programming CO4: Acquire the knowledge about the Multimedia Representation and data structures, File Format Standards along with digital audio and video CO5: Comprehend the different Hypermedia and Mobile Messaging, Recognize the authoring and Distributed concepts of the Multimedia Technology

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Graphics Systems and 2D-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 [9]

Lab Exercise: Implement DDA and Bresenham Algorithm for Line drawing

Two-Dimensional Transformations and Viewing [9]

Two-Dimensional Geometric Transformations – Types-Matrix Representation-Two Dimensional Viewing –Concatenation-Scaling-Rotation-2D-Translation–Morphing-Mirroring-Clipping:Cohen Sutherland Line Clipping Algorithm, Sutherland-Hodgeman Polygon Clipping.

Lab Exercise: Perform 2D Transformations such as translation, rotation, scaling, reflection and shearing

Three-Dimensional Concepts and Graphics Prgramming [9]

Three-Dimensional Object Representations – Polygon surfaces, Spline surfaces, Bezier curves –Octrees-Three-Dimensional Geometric and Modeling Transformations–Types-Three-Dimensional Viewing - Color models-Graphics programming using openGL.

Lab Exercise: Perform conversions between various color models

Multimedia Basics [9]

Introduction and definition-Multimedia software and Hardware-Media representation-Data and file format standards-TIFF,RIFF,MIDI,TWAIN File formats-Multimedia database-Multimedia data structures-KD trees –R trees, User Interface Design.

Lab Exercise: Design a certificate for an event

Multimedia Authoring and Hypermedia Messaging [9]

2D authoring-3D authoring-authoring using flash-Object Display/Playback Issues – Hypermedia Messaging – Mobile Messaging – Hypermedia Message Components – Hypermedia Linking and Embedding – Creating Hypermedia Messages – Components of Distributed Multimedia Systems.

Lab Exercise: Design a brochure for an event in your institution

Total Hours 45

Text book(s):

1.	Donald Hearn and Pauline Baker M, “Computer Graphics C Version”, 3rd Edition, Pearson Education, 2011.
2.	PrabhatK.AndleighandKiranThakrar, “Multimedia Systems and Design”, PHI, 2009.

Reference(s):

1.	Judith Jeffcoate, “Multimedia in practice technology and Applications”, PHI,1998.
2.	Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles & Practice”, Pearson Education, 2nd edition, 2003.
3.	http://nptel.ac.in/
4.	Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers, 2006

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3										3	2	
CO2	3	2	3	2									3	2	
CO3	3	2	3	2	3								3	2	
CO4	2		2		3								3		2
CO5	2		2		3								3		2

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50 IT E15 – Bioinformatics

IT

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

Objective(s)

- To expose the need for Bioinformatics technologies
- Be familiar with the modeling techniques
- To learn microarray analysis
- To exposed to Pattern Matching and Visualization
- To demonstrate the architecture and applications of bioinformatics

Course Outcomes	**At the end of the course, the students will be able to** CO1:Identify the data processing, applications and roles of structural bioinformatics CO2: Analyze the data using machine learning and neural networks in bioinformatics CO3: Compare the models for biological data analysis CO4: Categorize the dimensional and sequence representation in visualization CO5: Apply the microarray technology to analyze data in bioinformatics

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hoursindicated.

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 aOInalysis 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

Textbook(s):

1. Yi-ping Phoebe Chen (Ed),"Bioinformatics Technologies", 2nd Indian Reprint, 2014.
2. Chen,"Bioinformatics",Springer Publisher,2nd Edition, 2018.

Reference(s):

1. Bryan Bergeron ,"Bioinformatics computing", 2nd Edition , Pearson Education, 2015.
2. Arthur M Lesk, "Information to bioinformatics", 4th Edition, Oxford University Press, 2013.
3. Stephen A.Krawetz and David D.Womble,"Introduction to Bioinformatics", Humana Press, 2016
4. S.C.Rastogi,N.Mendiratta and P.Rastogi,"BioInformatics",4th Edition,PHI Learning,2018

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2				2							3		
CO2	2	2					2							2	2
CO3	2	2	2				2			2					
CO4	2	2	1	2			2	2			3				
CO5	3	3	2		2		1		1			2			

K.S.Rangasamy College of Technology - Autonomous R2018

50 IT E16 – Compiler Design

IT

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

Objective(s)

- To assess the various phases of compiler.
- To inspect the various parsing techniques.
- To interpret theIntermediate code generation and run-time environment.

	• To design the front-end of the compiler. • To perceive the implementation of code generator.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Predict the phases of compiler CO2: Apply different parsing algorithms to develop the parsers for a given grammar CO3: Perform syntax-directed translation with intermediate language CO4: Analyze the environment for storage of generated intermediate code CO5: Develop the optimized code generator.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering –Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA. [9]

Syntax Analysis

Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar -Top Down Parsing – General Strategies Recursive Descent Parser 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 Analyzer-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 V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2014.
2.	Douglas Thain,Introduction to Compilers and Language Design,Second Edition,Pearson,2019.

Reference(s):

1.	Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2011
2.	V. Raghavan, Principles of Compiler Designl, Tata McGraw Hill Education Publishers, 2010.
3.	Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.
4.	Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers, Elsevier Science, India, Indian Reprint 2003.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	2	1	3	3	1	1	2	3	3	2
CO2	3	3	2	2	2	1	2	3	3	1	2	2	3	3	
CO3	3	3	2	3	2			2	2		2	1	2	3	
CO4	3	2	2	3	2			2	2		2	1		3	2
CO5	3	2	2	3	1			1	3		2	1		3	1

K.S.Rangasamy College of Technology - Autonomous R2018

50 IT E17 - Foundation Skills in Integrated Product Development

IT

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

Objective(s)	• To facilitate the acquisition of the foundation skills in the process- tools • To understand the global trends and development methodologies of various types of products and services

	• To improve students awareness and understanding of the basic concepts involved in Integrated product Development (IPD) • To adopt the techniques in the Integrated Product Development area of the Engineering Services industry • To provide the requisite understanding towards application of academic topics from engineering disciplines into real world engineering projects
Course Outcomes	**At the end of the course, the students will be able to** CO1: Classify the various types of products and services and develop product management plan CO2: Describe requirement engineering and analyze how to collect, analyze and arrive at requirements for new product development and convert them in to design specification CO3: Conceptualize new product integrating the Hardware, software, controls, electronics and mechanical systems and perform detailed product design CO4: Ensure the integral part of all design, development, production and in-service support CO5: Develop product with seurity

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Fundamentals of Product Development

Global Trends Analysis and Product decision:Types of various trends affecting product decision - Social Trends - Technological Trends- Economical Trends - Environmental Trends - Political/ Policy Trends - PESTLE Analysis.Introduction to Product Development Methodologies and Management: Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management. [9]

Requirements and System Design

Requirement Engineering:Types of Requirements - Requirement Engineering - Traceability Matrix and Analysis - Requirement Management. System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design. [9]

Design and Testing

Industrial Design and User Interface Design - Introduction to Concept generation Techniques - Concept Screening & Evaluation - Detailed Design: Component Design and Verification - High Level Design/Low Level Design of S/W Programs - S/W Testing - Hardware Schematic - Component design - Layout and Hardware Testing.Prototyping:Types of Prototypes - Introduction to Rapid Prototyping and Rapid Manufacturing. SystemIntegration – Testing - Certification and Documentation - Introduction to Product verification and validation processes - Product Testing standards, Certification and Documentation. [9]

Sustenance Engineering and End-of-Life Support

Maintenance and Repair – Enhancements - Obsolescence Management - Configuration Management - EoL Disposal - Software sustenance. [9]

Business Dynamics- Engineering Services Industry

Overview of Engineering Services Industry - Challenges of Indian Economy - ER& D value chain – Product development in Industry versus Academia. The IPD Essentials - Introduction to vertical specific product development processes - Product development Trade-offs - Intellectual Property Rights and Confidentiality - Security and configuration management. [9]

Total Hours 45

Text book(s):

1.	Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", TataMcGraw Hill, 5th Edition, New Delhi, 2011.
2.	John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill,11th Edition, New Delhi, 2005.

Reference(s):

1.	Hiriyappa B, “Corporate Strategy – Managing the Business”, Authorhouse, USA, 2013.
2.	Peter F Drucker, “People and Performance”, Butterworth – Heinemann, [Elsevier],Oxford, UK, 2004.
3.	Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Conceptsand Practice”, Prentice Hall India, New Delhi, 2003
4.	Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design",McGraw Hill Education, Seventh Edition, New Delhi, 2013.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3				3							2	3	3	3
CO2	3	3	3	2	3							2	3	3	3
CO3	2	2	3	3	3							2	3	3	3
CO4				3	3							2	3	3	3
CO5	2	2	2	2	3							2	3	3	3

K.S. Rangasamy College of Technology – Autonomous R2018								
50 IT E18 / 50 IT L08– Programming in Java								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
V	3	0	0	45	3	40	60	100

Objective(s)	• To understand the concepts of object oriented Programming to develop applications. • To develop programs using the packages, interfaces, exceptions and threads. • To develop applications using I/O streams and serialization. • To develop programs using Collection APIs. • To analyze and develop the JDBC technology with real world problems.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Design classes, objects with data Abstraction, Polymorphism and inheritance concepts. CO2: Prompt the package, interface, String handling classes and observe predefined and user Defined Exception handling. CO3: Analyze the importance of lang package and I/O file system. CO4: Compose the functionalities of collections framework classes and interfaces. CO5: Apply the database concepts with JDBC connectivity.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction
An overview of Java, Arrays, Methods, Object oriented java programming - Classes and Objects, Inheritance and Polymorphism, Wrapper Class, Abstraction [9]

Java Concepts
Packages and Interfaces, Exception handling, Multithreaded programming, String Handling [9]

I/O Streams
Introduction to Lang package, I/O packages – File, The stream classes, The byte streams, The character streams,Serialization, Externalizable. [9]

Collection Framework
The Collection Interfaces, The Collection Classes and Interfaces, using an Iterator, Working with Maps, The Legacy Classes and Interfaces, String Tokenizer. [9]

Java Database Connectivity
Java Database Programming-Introduction, Relational Database Systems, DML, DDL, DCL and TCL, JDBC, Statement, Prepared Statement. [9]

Total Hours 45

Text book(s):

1. Herbert Schildt, “Java: The Complete Reference”, Comprehensive coverage of the Java language, Oracle press, Tenth Edition, McGraw-Hill, 2017.
2. Y.Daniel Liang “Introduction to Java Programming”, Comprehensive Version, Tenth Edition, Pearson Education, 2015 [JDBC only].

Reference(s) :

1. “Advanced programming in JAVA”, Prentice – Hall of India Private Limited NIIT – 2003.
2. Pratik Patel and Karlmoss, “Java Data base programming with JDBC”, Second Edition, Dream Tech Press - 2000.
3. Bert Bates and Kathy Sierra, "Head First Java", SecondEdition, O'Reilly's, 2009.
4. Online Resources : https://www.tutorialspoint.com, https://www.javatpoint.com, https://www.journaldev.com, https://beginnersbook.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

Rev.No.5 / w.e.f. 10/07/2023
Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

K.S.Rangasamy College of Technology – Autonomous R2018								
50 IT E21 - High Performance Networks								
IT								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VI	3	0	0	45	3	40	60	100

Objective(s)	• To acquire the relationship between the TCP/IP protocol machine architecture. • To explore the Internet routing protocols. • To predict the phases of the congestion control and traffic management system. • To inspect the integrated and differentiated services. • To analyze protocol with QOS parameter and Network Optimization.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Predict the relationship between TCP/IP Protocol Architecture and ATM architecture. CO2: Design and Implement internet routing protocol. CO3: Implement congestion control mechanisms. CO4: Design the Queuing disciplines with integrated services and differentiated services. CO5: Develop the protocols supporting QOS.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Frame Relay Network and ATM [9]

TCP and IP protocol architecture–applications–Frame Relay Networks–Asynchronous transfer mode–ATM Protocol Architecture–ATM logical Connection–ATM Cell–ATM Service Categories–High Speed LANs–Fast Ethernet–Gigabit Ethernet–Fiber Channel.

Internet Routing Protocols [9]

Internet Routing Principles– Distance Vector Routing–RIP– Link State Routing with OSPF–Path-Vector protocols–BGP And IDRP– Multicast Routing–Requirements for Multicasting–Internet Group Management Protocol.

Congestion and Traffic Management [9]

Effects of Congestion –Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control – TCP Flow control – TCP Congestion Control – Retransmission.

Integrated and Differentiated Services [9]

Integrated Services Architecture – Approach – Components Services– Queuing Discipline–FQ–PS–BRFQ– GPS– WFQ – Random Early Detection– Differentiated Services–QOS Parameters.

QoS Analysis and Support Protocols [9]

Little's theorem, Birth and Death process, queueing discipline Markovian FIFO queueing system, Non-markovian - Pollaczek-Khinchin formula and M/G/1, M/D/1, self-similar modelsand Batch-arrival model, Networks of Queues – Burke's theorem and Jackson Theorem. RSVP –Protocol Mechanisms – Multiprotocol Label Switching – Operations–Label Stacking Protocol details.

Total Hours 45

Text book(s):

1. Fred Halsall and Lingana Gouda Kulkarni, "Computer Networking and the Internet", Fifth Edition, Pearson Education, 2012.
2. William Stallings, "High Speed Networks And Internet", Pearson Education, 2nd Edition, 2002.

Reference(s):

1. Nader F.Mir, "Computer and Communication Networks", Pearson Education, 2015
2. Aunurag Kumar, D. Manjunath, Joy Kuri, "Communication Networking", Morgan Kaufmann Publishers, 2011.
3. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.
4. Derek DeJonghe,NGINX Cookbook: Advanced Recipes for High-Performance Load Balancing,O'REILLY, 2020.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2				3			2	3	3	
CO2	3	3	3	2	2				3			2	3	3	
CO3	3	3	3	2	2				3			2	3	3	
CO4	3	3	3	2	2				3			2	3	3	
CO5	3	3	3	2	2				3			2	3	3	

K.S.Rangasamy College of Technology – Autonomous R2018

51 IT E22 – Distributed Component Architecture

IT

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

Objective(s)

- 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 analyze different COM techniques in .NET components and design a framework for component
- To gain knowledge on assembly tools and testing tools

Course Outcomes

At the end of the course, the students will be able to

CO1: Acquire knowledge about distributed components techniques and callbacks
CO2: Analyze threads, Java Beans with its events and properties and archive files
CO3: Develop CORBA component technology with its implementation
CO4: Classify .net based component technologies for client server connection
CO5: Examine the concept of distributed component framework with its development tools

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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 [9]

Lab Exercise :Create an application of number conversion using COM/DCOM

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]

Lab Exercise : Create an application to deploy the components for multimedia file

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 [9]

Lab Exercise :Create a Time display distributed application using CORBA

. 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 [9]

Lab Exercise :Create a mark list application using Net Beans IDE

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]

Lab Exercise : Create a calculator application using EJB

Total Hours 45

Text book(s):

1. Clemens szyperski,DominikGruntz and Stephan Murer ,Component Software beyond object oriented programming, third edition, Pearson education,2004.
2. Robert Orfali,DanHarkey,JeriEdwards,Client/ Server Survival Guide, Third edition,Johnwiley Inc,2003.

Reference(s):

1. G.SudhaSadasivam, “Component - Based Technology”, Wiley India Pvt. Ltd, 2008.

Rev.No.5 / w.e.f. 10/07/2023
Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023 **BoS Chairman Signature**

2.	David Chappell, Understanding .NET, Pearson Education Inc, 2002.
3.	Bill Burke, Richard Monson-Haefel, Enterprise JavaBeans, Fifth Edition, O'Reilly, 2001.
4	Mowbray, "Inside CORBA", Pearson Education, 2003.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2								3	3	2
CO2	3	3	3	2	2								3	3	2
CO3	3	3	3	2	2								3	3	2
CO4	3	3	3	2	2								3	3	2
CO5	3	3	3	2	2								3	3	2

K.S. Rangasamy College of Technology – Autonomous R2018

50 IT E23 - Distributed Computing

IT

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

Objective(s)

- Tounderstandtheconceptofdistributedcomputingandtheissuesofoperating systems.
- To understand the concept of distributedprocessing.
- Tounderstandtheconceptofdistributedfilesystem.
- To classify the various models of distributed systems.
- To demonstrate the architecture of distributed systems.

Course Outcomes

At the end of the course, the students will be able to

CO1: Attain the knowledge in the hardware and software concepts of distributed systems

CO2:Conquertheknowledgeaboutthelayeredprotocols,ATMclient-servermodel,RPC and group communication.

CO3: Conquer the knowledge about synchronization, threads, processes and processor allocation in distributed systems.

CO4: Explore the concepts of semantics and interface design of distributed file system.

CO5: Acquire the knowledge about the distributed programming languages and various case studies about the distributed systems.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introducing- Goals – hardware concepts- bus based multiprocessor- switched multiprocessor – bus based multicomputer – switched multicomputer – software concepts – network operating system – True distributed system – Multiprocessor time sharing system – design issues – transparency – Flexibility – reliability – Performance and Scalability. [10]

Inter Processes Communication and Distributed Objects

Communication – Message Passing Communication – Transaction Communication - group communication- Client Server mode- remote procedure call. [9]

Operating System Issues – I

Synchronization – Clock Synchronization – Distributed Mutual Exclusion – Election Algorithms – Atomic transaction – Deadlock – Threads – System models – Processor Allocation – Scheduling – fault tolerance – Real time system. [9]

Operating System Issues – II

Distributed file systems – Distributed file system design – implementation – file models – fault tolerance - file replication – multimedia. [8]

Distributed Processing

General architecture of DSM systems - consistency models – page based distributed shared memory – shared variable distributed shared memory – Distributed programming languages – case studies. [9]

Total Hours 45

Text book(s):

1.	Andrew S.Tanenbaum,"Distributed Systems", 3rd Edition, Pearson Education Asia, 2017
2.	Seema Shah and Suita Mahajan,"Distributed Systems", Oxford University Press ,2nd Edition,2013

Reference(s) :	
1.	Mukesh singhal and niranjanG.Shivaratri, —Advanced concepts in Operating system, Tata McGraw Hill.
2.	Pradeep.k and Sinha, Distributed operating systems,PHI, New delhi, 2009
3.	Andrew S Tanenbaum, “Distributed Operating Systems”, Fourth Edition, Pearson Education Asia, 2019
4.	Pradeep K.Sinha, Distributed Operating Systems”,PHI,New delhi,2014

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2		1	2			3	2		2	3	3	1
CO2	3	2	2			1				2	2	3	3	3	2
CO3	3	2	2			1				2	2	2	3	3	1
CO4	2	2	3	2		2					3	3	3	3	1
CO5	3	1	2		3	2			3	2		2	3	3	2

K.S.Rangasamy College of Technology – Autonomous R2018

51 IT E24 – Data Mining Techniques

IT

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

Objective(s)

- To serve as an introductory course for undergraduate students to learn the fundamental concepts and modern techniques for data mining
- To focus on the key tasks of data mining, including data preparation and of data warehousing with special emphasis on architecture
- To design, analyze and solve key tasks of data mining, including data preparation, classification, clustering, and association rule mining
- To explore the fundamental concepts outliers
- To focus on the applications of data mining.

Course Outcomes

At the end of the course, the students will be able to

CO1: Identify the suitable data mining functionalities to find the similarity and dissimilarity between data.

CO2: Solve real-time problems using data pre-processing techniques and design warehouse models for organizational requirements.

CO3: Apply the different pattern mining methods to extract frequent itemsets in a transactional dataset.

CO4: Analyze the diverse classifiers and clustering techniques, apply the same to large datasets.

CO5: Analyze the outlier analysis techniques to solve real world problems.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction, Data Mining, Kinds of data & pattern, Technologies, Applications, Issues, Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity. [9]

Lab Exercise: Statistical Analysis using R

Data Preprocessing, Data Warehousing

Data Preprocessing, Overview, Cleaning, Integration, Reduction, Transformation, Data Discretization, Data Warehouse: Basic Concepts, Data Warehouse Modeling, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction. [9]

Lab Exercise: Clustering the Fisher iris data set using MAT lab.

Pattern Mining

Basic Concepts, Frequent Itemset Mining Methods, Pattern Evaluation Methods, Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space. [9]

Lab Exercise: Mining Frequent Itemsets using Weka Tools

Classification and Clustering

[9]

Classification, Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Bayesian Belief Networks, Classification by Backpropagation, Clustering, Cluster Analysis, Partitioning Methods, Hierarchical Methods.
Lab Exercise: Clustering a gene expression dataset related to lung cancers using MAT lab.

Outlier Detection and Data Mining Trends

Outliers and Outlier Analysis, Outlier Detection Methods, Statistical Approaches, Mining Complex Data Types, Other Methodologies of Data Mining, Data Mining Applications, Data Mining and Society, Data Mining Trends. [9]
Lab Exercise: Outlier Detection Based on Low Density Models using MAT lab.

Total Hours 45

Text book(s):

1.	Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kaufmann Publishers, 2012.
2.	Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.

Reference(s):

1.	David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2012.
2.	Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2006
3.	Alex Berson, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", McGraw-Hill Edition, 2007.
4.	Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2								3	3	1
CO2	3	3	3	3	2								3	3	1
CO3	3	3	3	3	2								3	3	1
CO4	3	3	3	3	2								3	3	1
CO5	3	3	3	3	2								3	3	1

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50 IT E25 - Database Administration

IT

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

Objective(s)

- To study the design and implementation of relational database solutions
- To study basic concepts of storage, concurrency and availability for performance management
- To study the database script development for data manipulation and database administration
- To understand and perform database administration tasks, such as database monitoring, performance tuning, data transfer and security.
- To gain knowledge on database migration

Course Outcomes

At the end of the course, the students will be able to

CO1 : Realize the scope and various components of DBA
CO2 : Apprehend Database design with RDBMS
CO3 : Identify the basic concepts of storage, concurrency and availability for performance management
CO4 : Perform risk assessments and security administration to protect data integrity.
CO5 : Execute database administration in networked and distributed environment.

Note:The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Database Administration – DBA Tasks – Types – Impact of newer technologies – Creating the database environment – Defining the DBMS strategy – Installing the DBMS – Data modeling and normalization – Entity relationship diagramming – Components – Data Models – Normalization. [9]

Database and Application Design, Change Management

Logical model to physical database – Database performance design – Denormalization – Views – Temporal Data Support – Database application development and SQL – Defining Transactions – Locking - Batch processing – Requirements – Types – Impacts. [9]

Data Availability, Performance Management Availability – Problems - Downtime cost – Routine maintenance – Automate DBA functions – Defining performance management – Monitoring versus Management - Performance tuning – Types – Tools – Optimizing databases – Techniques – Database reorganization – Relational optimization SQL coding and tuning for efficiency – Data integrity – Structure, semantic data integrity.	[9]
Database Security, Regulatory Compliance and Administration Data Breaches – Users – Granting and revoking authority – Roles and groups – SQL Injection - Auditing - Meta data management – Data masking – Database archiving for long-term data retention – Backup – Recovery – Alternative to backup and recovery – Disaster planning.	[9]
Data Storage and Connectivity Files and data sets – Space management – Storage options – Planning for the future – Loading and unloading – Bulk data movement – Distributed Databases – Multitier, distributed computing – Network traffic – Internet-connected databases – Web services – Meta data management - Database migration strategies.	[9]
Total Hours	**45**

Text book(s):	
1.	Craig S. Mullins, "Database Administration: The Complete Guide to DBA Practices and Procedures", Addison-Wesley Professional, 2nd Edition, 2013.
2.	Thomas Connoly and CarlolynBegg, “Database Systems, A Practical Approach to Design, Implementation and Management”, 6th Edition, Pearson Education 2014.
Reference(s) :	
1.	Sam R. Alapati, “Expert Oracle Database 11g Administration”, Apress, 2012.
2.	William Assaf , Randolph West , Sven Aelterman , Mindy Curnutt ,“SQL Server 2017 Administration Inside Out”, Pearson Education,2018.
3.	Dennis Shasha and Philippe Bonnet, “Database Tuning, Principles, Experiments and Troubleshooting Techniques”, Elsevier Reprint 2005.
4.	Carlos Coronel, Steven Morris“Database Systems: Design, Implementation, & Management”, 13thEdition,Cengage Learning,2019

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2	3		2							3	2	
CO2			2	3		2							3	2	
CO3		2	2	3	3								3	2	
CO4		2	2	3	3			2	2				3	2	
CO5		2	2	3	3			2	2				3	2	

K.S. Rangasamy College of Technology – Autonomous R2018

51 IT E26 - Digital Image Processing

IT

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

Objective(s)	• To understand the image fundamentals and steps in image processing • To learn the image enhancement models • To explore the image compression standards • To analyze the image restoration and segmentation procedures • To understand the fundamentals of image representation and description
Course Outcomes	**At the end of the course, the students will be able to** CO1: Identify the fundamentals of digital image and the principles of color image processing CO2: Perform the image enhancement in spatial domain and enhance the image to a desired quality in frequency domain CO3: Implement the image compression models and different methods for lossy and lossless compression CO4: Examine the basics of image restoration and segmentation techniques CO5: Analyze the methods for image representation and description

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Digital Image Fundamentals

Origins of digital image processing – 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 Models- Pseudocolor image processing – Basics of full color image processing. [9]

Lab Exercise: MATLAB program for Pseudo Coloring

Image Enhancement [9]

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Enhancement using arithmetic/logic operations – Spatial filtering: smoothing, sharpening filters – Frequency domain methods: Frequency domain filters: smoothing, sharpening – Homomorphic filtering.

Lab Exercise: MATLAB program for Power Law Transformation.

Image Compression and Wavelets [9]

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.

Lab Exercise: MATLAB program for Chain Coding.

Image Restoration and Segmentation [9]

Noise models – Mean Filters – Adaptive filters - Notch Filters – Inverse Filtering – Wiener filtering- Detection of discontinuities – Edge linking and boundary detection – Thresholding – Region based segmentation – Segmentation by morphological watersheds.

Lab Exercise: MATLAB program for Edge Detection using Sobel, Prewitt and Roberts Operators**.**

Image Representation and Description [9]

Representation – Boundary descriptors: Shape numbers, Fourier descriptors, Statistical moments – Regional descriptors: Topological descriptors, Texture – Relational descriptors - Patterns and Pattern classes - Recognition based on matching.

Lab Exercise: MATLAB program for Morphological Operations on Binary Images.

Total Hours 45

Text book(s):

1.	Rafael C Gonzalez, Richard E. Woods, “Digital Image Processing”, Pearson Education, 3rd Edition, 2015.
2.	Jayaraman S., Veerakumar T., EsakkirajanS.,“Digital Image Processing”, Tata Mc Graw Hill Education, New Delhi, 2009.

Reference(s):

1.	William K Pratt,” Digital Image Processing”, CRC press, 2013.
2.	Wilhelm Burger, Mark J.Burge, “Principles of Digital Image Processing”, Springer International edition, 2013.
3.	Annadurai S. and Shanmugalakshmi R., “Fundamentals of Digital Image Processing”, Pearson Education, 2007.
4.	S.Sridhar, “Digital Image Processing”, Oxford University Press Higher Education,2016.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	3			1	1	1	1	1	1	1	1
CO2	2	1	3	3	3			1	1	1	1	1	1	1	1
CO3	2	1	3	3	3	2	2	1	1	1	1	1	1	1	1
CO4	2	1	3	3	3	2	2	1	1	1	1	1	1	1	1
CO5	2	1	3	3	3	2	2	1	1	1	1	1	1	1	1

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50 IT E27 – Information Retrieval Techniques

IT

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

Objective(s)

- To study the basic retrieval techniques of information
- To understand the basics of information retrieval with pertinence to modeling, 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

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Course Outcomes	**At the end of the course, the students will be able to** CO1:Evaluate the performance of retrieval using algebraic and probabilistic models CO2: Apply different types of queries to retrieve information CO3: Compare various indexing and searching in retrieval and visualize it. CO4: Categorize complex indexing approach to retrieve data CO5: Implement online IR systems and libraries to retrieve data

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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 Retrievalǁ, Cambridge University Press, First South Asian Edition, 2008.

Reference(s):

1.	G.G. Chowdhury, “Introduction to Modern Information Retrieval”, Neal-Schuman Publishers, 2nd edition, 2003.
2.	Daniel Jurafsky and James H. Martin, “Speech and Language Processing”, Pearson Education, 2000.
3.	David A. Grossman, Ophir Frieder, “Information Retrieval: Algorithms, and Heuristics”, Academic Press, 2000.
4.	Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, “Text Information Retrieval Systems”, Academic Press, 2000.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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			2								2	3	1

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50 IT E31 - Wireless Sensor Networks

IT

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

Objective(s)

- To learn the basic principles behind a Wireless Sensor Network
- To analyze the constraints and protocols of MAC layer protocol
- To assess network protocols, services and applications for WSNs
- To demonstrate the functions of Transport Layer protocols
- To understand the challenges involved in managing a sensor network

Course Outcomes	**At the end of the course, the students will be able to** CO1: Realize the characteristics and functionalities of Wireless Sensor Networks CO2: Analysis of various parameters in deploying a MAC layer Protocol CO3: Design the routing protocols for Wireless Sensor Networks CO4: Analyze the functions of transport layer protocol CO5: Develop wireless sensor systems for different applications

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Wireless Sensor Networks - Challenges - Characteristics - Comparison of Mobile Ad-Hoc Networks a Sensor Networks - Single- Node Architecture - Hardware Components - Energy consumption of Ser Nodes – Operating Systems - Execution -Environments - Sensor Network Scenarios - Time synchronizat Time synchronization problem, protocols based on sender to receiver and receiver to recei synchronization in WSN. [9]

Mac Layer

MAC addressing - Requirements and Design Constraints for Wireless MAC Protocols - MAC Protocols Wireless Sensor Networks - S-MAC – LEACH - IEEE 802.15.4 MAC protocol. [9]

Network Layer

Routing Protocols: Issues in designing a routing protocol, classification of routing protocols, Table-driven, (demand, Hybrid, flooding, hierarchical, and power aware routing protocols. [9]

Transport Layer

Coverage and Deployment - Reliable Data Transport - Single Packet Delivery - Block Delivery - Conges Control and Rate Control. [9]

Data Storage And Application

Data centric and content based routing, storage and retrieval in network, compression technologies for W Data Aggregation technique. Applications: Detecting unauthorized activity using a sensor network, WSN Habitat Monitoring. [9]

Total Hours 45

Textbook(s):

1.	Holger Karl and Andreas Willig,"Protocols and Architectures for Wireless Sensor Networks",Wiley,2013.
2.	Ian F. Akyildiz , Mehmet Can Vuran ," Wireless Sensor Networks", Wiley, 1st Edition ,2011.

Reference(s):

1.	Mahalik, Nitaigour P," Sensor networks and configuration : fundamentals, standards, platforms, and applications", Heidelberg : Springer,2010.
2.	C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson education, 2006.
3.	Feng Zhao & Leonidas J.Guibas, "Wireless Sensor Networks – An Information Processing Approach", Elsevier, 2007.
4.	William Stallings, "Wireless Communications and Networks ", Pearson Education - 2014

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2							3		3		3	3	
CO2	3	2	3	3	3				3		3		3	3	
CO3	3	2	3	3	3				3		3		3	3	
CO4	3	2	3	3	3				3		3		3	3	
CO5	3	2	2	2	2				3		3	3	3	3	

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50 IT E32 / 50 IT L12 - MERN Stack

IT

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

Objective(s)

- To know the basics operations involved in MongoDB
- To understand the fundamentals of Express JS
- To involving the various component and lifecycle of React JS
- To demonstrate the fundamentals of Node JS
- To explore the various case studies involved in MongoDB, Node JS and React JS

Course Outcomes	**At the end of the course, the students will be able to** CO1:Categorize the various operations involved in MongoDB CO2:Incorporate the updating records, file and connecting strings in Express JS CO3:Create Advance javascript web pages with the component APL and States in React JS CO4:Optimize the performance of advanced web page using the REPL in Node JS CO5: Illustrate the real time applications involved in MongoDB, React JS and Node JS

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

MongoDB Basics [9]

MongoDB-Importing, Exporting, and Querying Data-Creating and Manipulating Documents-Advanced CRUD Operations-Indexing and Aggregation Pipeline

Lab Exercise: Develop a using MongoDB to generate a report from the restaurant database

Express JS [9]

Configuring Routes-Working with Express-Serving Static Files-Working With Middleware-Connecting Stri Configuring-Working With Select Command-Updating Records-Deleting Records

Lab Exercise: Create a hello world application specified by ExpressJs

React JS [9]

History of front end libraries- Motivation for using React- Key differentiators(Virtual DOM, One way bindin Thinking in React-React Component-React Function-Component API-Component lifecycle-State,Pro Mixins-JSX-Reconciliation algorithm

Lab Exercise: Create 3 squares that are vertically and horizontally centered are mentioned by the ReactJs

Node JS [9]

Introduction to Node JS- Node JS Process Model-Advantages of Node JS-Traditional Web Server Model Install Node.JS on Windows-Working on REPL, Node JS Console-Function,Buffer,Module-Core Modules Local Modules-Modules Types-Modules Exports

Lab Exercise: Create an application in node.js which manages employees

Real time Applications [9]

Case Study on Real time (Mongodb)-Case Study on real time applications(React JS)

Lab Exercise: Real time applications in Node JS

Total Hours 45

Text book(s):

1. Shannon Bradshaw, Eoin Brazil, Kristina Chodorow, “MongoDB: The Definitive Guide”,3rd Edition,2019
2. Mario Casciaro, Luciano Mammino, “Node.js Design Patterns”,3rd Edition, 2020

Reference(s):

1. Kristina Chodorow, “MongoDB: The Definitive Guide: Powerful and Scalable Data Storage” ,2nd Edition, 201
2. KirupaChinnathambi, “Learning React: A Hands-On Guide to Building Web Applications Using React”, 2018
3. www.w3schools.com
4. Vasan Subramanian, “Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, Node”, 2019

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		2	2							3		
CO2	3	2	1		2		2		3					3	
CO3	3	1	2		2					2		2			3
CO4	3	2	2	2	2			2			1				
CO5	3	2	2		2										

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50 IT E33 - Pattern Recognition

IT

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

Objective(s)

- To learn about supervised and unsupervised pattern classifiers
- To analyze the different clustering concepts
- To familiarize the different feature extraction and selection techniques
- To explore the role of Hidden Markov models and SVM

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	• To investigate the application of fuzzy logic and genetic algorithm in pattern recognition
Course Outcomes	**At the end of the course, the students will be able to** CO1: Interpret the mathematics related to Pattern recognition CO2: Analyze the behavior of Clustering and Classification CO3: Apply methods for feature extraction and selection CO4: Develop the models using support vector machines CO5: Explore the recent advances in pattern recognition

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Pattern Classifier

Introduction and Mathematical preliminaries -- Overview of Pattern recognition – Discriminant functions – Supervised learning –Parametric estimation – Maximum Likelihood Estimation – Bayesian parameter Estimation – Pattern classification by distance functions – Minimum distance pattern classifier. [9]

Clustering

Clustering for unsupervised learning and classification – Clustering concept – C Means algorithm – Hierarchical clustering – Graph theoretic approach to pattern Clustering – Validity of Clusters. [9]

Feature Extraction and Structural Pattern Recognition

KL Transforms – Feature selection through functional approximation – Binary selection -Elements of formal grammars - Syntactic description - Stochastic grammars - Structural representation. [9]

Hidden Markov Models and Support Vector Machine

State Machines – Hidden Markov Models – Training – Classification – Support vector Machine –Feature Selection. [9]

Recent Advances

Fuzzy logic – Fuzzy Pattern Classifiers – Pattern Classification using Genetic Algorithms – Case Study Using Fuzzy Pattern Classifiers and Perception. [9]

Total Hours 45

Textbook(s):

1. M Narasimha Murthy and V Susheela Devi, “Pattern Recognition”, Springer 2011.
2. C M Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.

Reference(s):

1. S Theodoridis and K Koutroumbas, “Pattern Recognition”, 4th Edition, Academic Press, 2009.
2. Menahem Friedman, Abraham Kandel, “Introduction to Pattern RecognitionStatistical, Structural, Neural and Fuzzy Logic Approaches”, World Scientific Publishing Co. Ltd, 2000.
3. R O Duda, P E Hart and D G Stork, “Pattern Classification”, John Wiley, 2001
4. Robert J. Schalkoff, “Pattern Recognition Statistical, Structural and NeuralApproaches”, John Wiley & Sons Inc., 1992

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	3			1	1	1	1	1	1	1	1
CO2	2	2	3	3	3			1	1	1	1	1	1	1	1
CO3	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1
CO4	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1
CO5	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1

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50 IT E34 / 51 IT L05 - Mobile Application Development

IT

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

Objective(s)

- 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

Course Outcomes	**At the end of the course, the students will be able to** CO1:Examine the development environment to build mobile apps using emulator CO2:Appraise the user interface resources and activities to create mobile apps CO3:Review the various building blocks of mobile apps to establish the connection with database CO4:Explore the graphics and animation techniques with multimedia for mobile app Development using various sensors CO5:Recognize the process of testing an android app along with the method of versioning, signing, packaging and publishing.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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, a case study on Mobile app development [9]

Lab Exercise : Setting Up the Development Environment and run an app on the Android Emulator

Building Blocks of Mobile Apps

App user interface designing – mobile UI resources (Layout,UIelements,Draw-able, Menu), Activity-states and life cycle, interaction amongst activities, App functionality beyond user interface - Threads, Async task, Services [9]

Lab Exercise : Develop an app that uses GUI components and Layout

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) [9]

Lab Exercise : Develop an app that makes use of database

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) [9]

Lab Exercise : Create an app to play the Audio and Video clips

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, MonkeyTalk - Versioning, signing and packaging mobile apps, distributing apps on mobile market place [9]

Lab Exercise : Design an app that creates alarm clock and distribute it on market place

Total Hours 30+15(Practical) 45

Textbook(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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

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50 IT E35 - Web Mining								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VII	2	0	2	60	3	50	50	100
Objective(s)	• 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 hyper links in web structure mining • To understand social media data using appropriate data/web mining techniques • To appreciate the various aspects of web usage mining							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Identify the different components of a web page that can be used for mining CO2: Apply machine learning concepts to web content mining CO3: Design a system to collect information available on the web to build Recommender systems CO4: Analyze social media data using appropriate data/web mining techniques CO5: Build a simple search engine using available open source tools							

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction – Web Mining – Theoretical background –Algorithms and techniques – Association rule mining – Sequential Pattern Mining -Information retrieval and Web search – Information retrieval ModelsRelevance Feedback- Text and Web page Pre-processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta-Search – Web Spamming [9]

Lab Exercise: Create a model for finding the sequential mining using Python

Web Content Mining

Web Content Mining – Supervised Learning – Decision tree - Naïve Bayesian Text Classification – Support Vector Machines - Ensemble of Classifiers. Unsupervised 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]

Lab Exercise:Implementation of Latent Semantic Analysis using Python

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]

Lab Exercise: Implementation of Pagerank Algorithm

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]

Lab Exercise:Implementation of Web Scraper Algorithm using Python

Web Usage Mining

Web Usage Mining - Click stream Analysis -Web Server Log Files - Data Collection and Pre- Processing - Cleaning and Filtering- Data Modeling for Web Usage Mining - The BIRCH Clustering Algorithm - Affinity Analysis and the Apriori Algorithm – Binning - Discovery and Analysis of Web Usage Patterns – Modeling user interests –Probabilistic Latent Semantic Analysis – Latent Dirichlet Allocation Model– Applications- Collaborative Filtering- Recommender Systems – Web Recommender systems based on User and Item – PLSA and LDA Models. [9]

Lab Exercise:Implementation of Apriori Algorithm in Python

Total Hours 45

Textbook(s):

1. Bing Liu,"Web Data Mining, Exploring Hyperlinks,Contents and Usage Data",2nd Edition, Springer,2011.
2. GuandongXu ,Yanchun Zhang, Lin Li, "Web Mining and Social Networking: Techniques and Applications",1st Edition, Springer, 2011.

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Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Reference(s):	
1.	Zdravko Markov, Daniel T. Larose, —Data Mining the Web: Uncovering Patterns in Web Content, Structure, and Usagell, John Wiley & Sons, Inc., 2007.
2.	Soumen Chakrabarti, —Mining the Web: Discovering Knowledge from Hypertext Datall, Morgan Kaufmann Edition, 2003
3.	Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
4.	Joshua F. Wiley, “R Deep Learning Essentials”, 2nd Edition, Packt Publications, 2016.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	3									2	2
CO2	2	3	3	3	3								2	3	2
CO3	2	3	3	3	3								2	3	
CO4	2	3	3	3	3								2		2
CO5	2	3	3	3	3								2		2

K.S.RangasamyCollegeof Technology– Autonomous R2018

50 IT E36 - Software Quality Management

IT

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

Objective(s)

- To learn about the introduction of software quality, various hierarchical models of quality
- To acquire knowledge on software quality assurance
- To know about quality management models
- To explore the quality control, reliability models and quality management systems
- To recognize the different quality standards, process improvement models, CMM and CMMI

Course Outcomes

At the end of the course, the students will be able to

CO1: Recognize the fundamentals of software quality, metrics and quality measurements
CO2: Examine the concept of software quality assurance with different reviews and audits
CO3: Appraise the quality control with basics tools and models
CO4: Review the quality management system, frameworks and customer .satisfaction
CO5: Explore the different standards and process improvement models for quality

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Software Quality

Software Quality – Views of quality - Hierarchical models of quality - Boehm and McCall models – Measuring software quality – Software Metrics – The problems with metrics – An overall measure of quality – Gilb’s approach [9]

Software Quality Assurance

Definition and concepts – SQA plan – Teams – Characteristics – Implementation – Documentation – Reviews and Audits [9]

Quality Control and Reliability

Tools for Quality – Ishikawa’s basic tools – Defect Removal Effectiveness – Defect Removal Effectiveness and Quality Planning – Cost Effectiveness of Phase Defect Removal – The Rayleigh Mode – Exponential Distribution and Reliability Growth Models [9]

Quality Management System

Introduction - Elements of QMS – Quality Management Models – Rayleigh model framework – Reliability Growth models for QMS – Criteria for Model Evaluation – Complexity metrics and Models – Measuring and Analyzing Customer Satisfaction [9]

Quality Standards and Process Improvement

The purpose of standards – ISO 9000 Series – ISO 9001:2000 and 2008 – Applying ISO 9000 to software development – Models and standards for process improvement – CMM and CMMI – Alternate maturity models. [9]

Total Hours 45

Textbook(s):

1.	Allan C. Gillies, “Software Quality: Theory and Management”, 3rdedition, Thomson Learning, 2011.
2.	Stephen H. Kan, “Metrics and Models in Software Quality Engineering”, 2nd edition, Addison Wesley

	Professional, 2015.
Reference(s):	
1.	Daniel Galin, “Software Quality: Concepts and Practice”, 1st Edition, Wiley 2018.
2.	Norman Fenton, James Bieman, “Software Metrics: A Rigorous and Practical Approach”, 3rd Edition, CRC Press, 2015
3.	Mordechai Ben – Menachem and Garry S.Marliss, “ Software Quality: Producing Practical, Consistent Software ”, BS Publications, 2014.
4.	Mary Beth Chrissis, Mike Konrad and Sandy Shrum, “CMMI”, Pearson Education Pvt Ltd, 2007

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2							2			3	2	2
CO2	3	2	2										3	2	2
CO3	3	2	2	2	3	2	2						3	2	2
CO4	3	2	2			2							3	2	2
CO5	3	2	2		2								3	2	2

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50 IT E37 - Social Network Analysis

IT

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

Objective(s)

- To understand the components of the social network.
- To learn visualization of social network.
- To familiarize in mining algorithm.
- To understand the evolution of the social network.
- To know the applications in real time systems.

Course Outcomes

At the end of the course, the students will be able to

CO1 : Identify the internals components of the social network
CO2 : Visualize the social network
CO3 : Mine the behaviour of the users in the social network
CO4 : Predict the possible next outcome of the social network
CO5 : Apply social network in real time applications

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Discussion networks **-** Blogs and online communities - Web-based networks**.** [9]

Modeling and Visualization

Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation **–** Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix- Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications –Use of Hadoop and Map Reduce – Ontological representation of social individuals and relationships. [9]

Mining Communities

Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining – Applications of Community Mining Algorithms - Node Classification in Social Networks. [9]

Evolution

Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities – Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence - Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks - Expert Location without Graph Constraints - with Score Propagation – Expert Team Formation - Link Prediction in Social Networks - Feature based Link Prediction – Bayesian Probabilistic Models - Probabilistic Relational Models. [9]

Applications [9]

A Learning Based Approach for Real Time Emotion Classification of Tweets, A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments, Explaining Scientific and Technical Emergence Forecasting, Social Network Analysis for Biometric Template Protection **Total Hours 45**	
Textbook(s):	
1.	Peter Mika, 'Social Networks and the Semantic web', springer 1st Edition,2007.
2.	BorkoFurht, Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 2010.
Reference(s):	
1.	Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, "Computational Social Network Analysis: Trends, Tools and Research Advances",Springer, 2012
2.	Max Chevalier, Christine Julien and Chantal Soule-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
3.	Charu C. Aggarwal,"Social Network Data Analytics", Springer; 2014
4.	GuandongXu ,Yanchun Zhang and Lin Li, Web Mining and Social Networking – Techniques and applications, 1st Edition, Springer, 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2								3	3	3
CO2	3	3	3	2	2								3	3	3
CO3	3	3	3	2	2								3	3	3
CO4	3	3	3	2	2								3	3	3
CO5	3	3	3	2	2								3	3	3

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50 IT E41 / 52 IT L10 - Artificial Intelligence for Industry 4.0

IT

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

Objective(s)

- To develop the basic understanding of the building blocks of AI.
- To enhance the knowledge and skills of AI in solving real time problems.
- To identify the different technologies, problem settings, and their applications to solve multi-disciplinary problems.
- To understand the impact, applications and tools of Industry 4.0.
- To analyze the applications of Industry 4.0 to implement artificial intelligent systems

Course Outcomes

At the end of the course, the students will be able to

CO1: Classify the applications of AI to implement intelligent agents.
CO2: Apply the various technologies which are more appropriate for different types of learning tasks in mutliple domains.
CO3: Solve real-world problems using Machine Learning, Big Data and IoT.
CO4: Apply necessary tools to meet Industry 4.0 standards.
CO5: Develop a small AI system in a team environment.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality. [9]

Lab Exercise: Write a simple chatbot

Artificial Intelligence

Artificial Intelligence: Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI - Environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI. [9]

Lab Exercise:Study of diverse Artificial Intelligence Tools

Big Data and IoT

Terminologies - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning - Big Data in Databases - Big Data Use [9]

cases : Big Data in Social Causes - Big Data for Industry - Big Data Roles and Skills - Big Data Roles - Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications **Lab Exercise: Build and predict dataset using open source tools** **Impact, Applications and Tools of Industry 4.0** Impact of Industry 4.0 on Society: Impact on Business, Government, People – Applications: IoT Applications – Manufacturing – Healthcare – Education – Aerospace and Defence – Agriculture – Transportation and Logistics – Tools: Artificial Intelligence, Big Data and Data Analytics, Virtual Reality, Augmented Reality, IoT, Robotics	[9]
Lab Exercise:Word Count MapReduce Program Using Eclipse using Hadoop Programming **Applications of AI to Industry 4.0** Smart factories, Predictive Analytics, Predictive maintenance,Computervision,Cyber-physical systems,Industrial robots and Inventory Management	[9]
Lab Exercise: Face detection using OpevCV	
Total Hours	**45**

Textbook(s):	
1	P. Kaliraj, T. Devi, “Higher Education for Industry 4.0 and Transformation to Education 5.0”.
2	Alasdair Gilchrist. Industry 4.0: The Industrial Internet of Things, Apress Publications, 2016.
Reference(s):	
1	SudipMisra, “Introduction to Industry 4.0 and Industrial Internet of Things”, IIT Kharagpur.
2	A Complete Guide to Industry 4.0- Udemy Course-**https://www.udemy.com/course/intro-to-industry-4**
3	Rashmi Agrawal, Marcin Paprzycki, Neha Gupta, “Big Data, IoT, and Machine Learning Tools and Applications”, 1st Edition, CRC Press, 2020.
4	Aydin Azizi,“Applications of Artificial Intelligence Techniques in Industry 4.0”, Kindle Edition, 2018.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2						2	2	2	2	2	3
CO2	3	3	2	2						2	2	2	3	3	3
CO3	3	3	2	2						2	3	3	3	3	3
CO4	3	3	3	2						2	3	3	2	2	3
CO5	3	3	3	3	3					2	3	3	3	3	3

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50 IT E42 - Soft Computing and Optimization

IT

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

Objective(s)	• To learn about the various techniques in soft computing frame works • To analyze the different types of neural networks • To familiarize the rules in fuzzy logic • To learn the background of genetic programming • To understand the need of optimization
Course Outcomes	**At the end of the course, the students will be able to** CO1: Describe various techniques involved in soft computing CO2: Choose and design suitable neural network for real time problems CO3: Use fuzzy rules and reasoning to develop decision making CO4: Explain the importance of genetic programming CO5: Explore the optimization techniques

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Soft Computing Soft Computing Constituents-From Conventional AI to Computational Intelligence- Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks - basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts	[9]

Lab Exercise: Study the use of soft computing tools to develop applications in the engineering domain **Neural Networks** McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, Back Propagation Network, Radial Basis Function, Associative memory network: auto-associative,hetero-associative, Bidierctional, hopfield networks –unsupervised learning networks: Kohonen self-organizing feature maps, Learning Vector Quantization –Adaptive Resonance Theory network. Lab Exercise: Develop an Application using Neural Networks for Pattern Recognition and classification	[9]
Fuzzy Logic Membership functions: features, fuzzification, methods of membership value assignments Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems overview of fuzzy expert system-fuzzy decision making Lab Exercise: Design and implementation of fuzzy logic controller for different applications	[9]
Genetic Algorithm Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts - operators – Encoding scheme – Fitness evaluation – crossover - mutation - genetic programming – multilevel optimization – real life problem- advances in GA Lab Exercise: Implementation of Simple Genetic Application for Image processing and Pattern Recognition	[9]
Swarm Intelligence Swarm intelligence, Particle Swarm Optimization (PSO) Algorithm- Formulations, Pseudo-code, parameters, premature convergence, topology, biases, Real valued and binary PSO, Ant colony optimization (ACO)- Formulations, Pseudo-code. Applications of PSO and ACO. Lab Exercise: Design and Develop a certain scientific / commercial application using hybrid Soft Computing Systems	[9]
Total Hours	**45**

Textbook(s):	
1.	S N Sivanandam and S N Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2018
2.	J S R.Jang, C T Sun and E Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI / Pearson Education 2004
Reference(s):	
1.	S Rajasekaran and G A Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006
2.	Saroj Kaushik, Sunita Tiwari, “Soft Computing: Fundamentals, Techniques and Applications”, McGraw-Hill Education, 2018
3.	N P Padhy and S P Simon, “ Soft Computing : with Matlab Programming”, Oxford University Press, 2015.
4.	Samir Roy and Udit Chakraborty, “Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms”, Pearson Education, 2013.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3			1	1	1	1	1	1	1	1
CO2	2	2	3	3	3	3		1	1	1	1	1	1	1	1
CO3	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1
CO4	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1
CO5	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1

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50 IT E43 - Cyber Security and Forensics

IT

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

Objective(s)

- To know about security standards and how to secure the 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.
Course Outcomes	**At the end of the course, the students will be able to** CO1:Analyze the plan of criminals and the basics of cybercrime CO2: Explore the concept of mobile and wireless devices CO3: Identify the methods and tools used in cybercrime CO4: Analyze the methods and techniques used in computer forensics CO5: Identify the organizational implications with respect to cost and issues in cybercrime

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Cybercrime and information security – classification of cybercrimes – cybercrime and the India ITA2000 – A global perspective on cybercrimes - cyber stalking – cyber café and cybercrimes – botnets – attack vector. [9]

Lab Exercise: Identification of malware attack in network using wireshark

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 - Security policies and measures in mobile computing era. [9]

Lab Exercise: Study the use of Cellebrite UFED in mobile forensics

Tools and Methods used in Cybercrime

Proxy servers and Anonymizers – Phishing - Password cracking - Key loggers and Spy wares - Virus and worms - Trojan horse and Backdoors – Steganography – DOS and DDOS Attacks - SQL Injection - Buffer overflow - Attacks on wireless network. [9]

Lab Exercise: Ffinding vulnerabilities in web applications using OWASP

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- Setting up a computer forensic Laboratory - Relevance of the OSI 7 Layer model to computer Forensic - Computer forensic from compliance perspectives. [9]

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 – Techno legal Challenges with evidence from hand-held Devices - Cost of cybercrimes and IPR issues – incident handling: an essential component of cyber security. [9]

Lab Exercise: Detect internet vulnerability using Log4J

Total Hours 45

Textbook(s):

1.	Nina Godbole, SunitBelapure “Cyber security understanding cyber crimes, computer forensics and legal perspectives”, Wiley publication, 2014.
2.	Harish Chander, “Cyber laws & IT protection”, PHI learning pvt.ltd, 2012.

Reference(s):

1.	Adv. Prashant Mali “Cyber Law & Cyber Crimes Simplified”, 6th Edition, Kindle Edition, 2018.
2.	MS.M.K.Geetha&Ms.SwapneRaman, ”Cyber Crimes and Fraud Management”, Macmillan, 2012.
3.	Pankaj Agarwal, “Information Security & Cyber Laws (Acme Learning)”, Excel, 2013.
4.	Bhushan, Rathore, and Jamshed “Fundamentals of Cyber Security”BPB Publication,2017.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		3	2				2			2	2	3	3
CO2	2	3	3		3				2			2	2	3	3
CO3	2	3	3	3	3				2				2	3	3
CO4	2	3		3	2								2	3	3
CO5	2	3		3	2								2	3	3

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50 IT E44 - Natural Language Processing and Text Analytics

IT

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

Rev.No.5 / w.e.f. 10/07/2023
Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Objective(s)	• To realize the challenges and applications of natural language processing • To understand the methods involved in word level and syntactic level analysis • To understand the concepts of **Lexical Syntax and** the Semantic analysis • To acquire knowledge on machine translation approaches • To make clearon information retrieval techniques and its tools
Course Outcomes	**At the end of the course, the students will be able to** CO1: Analyze the natural language fundamentals and applications CO2: Demonstrate word level and syntactic level analysis CO3: Design representation of semantic analysis CO4: Assess natural language generation and machine translation CO5: Apply the natural language processing techniques to IR applications

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Overview and Language Modeling

Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages – NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model. [9]

Lab Exercise:Simple word analysis and word generation

Word Level and Syntactic Analysis

Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction- Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context -free Grammar-Constituency- Parsing-Probabilistic Parsing. [9]

Lab Exercise:Morphology and N-Grams smoothing

Lexical Syntax and Semantic Analysis

Lexical Syntax:Introduction to word types, POS Tagging, Maximum Entropy Models for POS tagging,Multi-word Expressions**.** Semantic Analysis: Meaning Representation-Lexical Semantics-Ambiguity-Word Sense Disambiguation [9]

Lab Exercise:Building POS Tagger

Natural Language Generation and Machine Translation

Natural Language Generation: Architecture of NLG Systems- Generation Tasks and Representations-Application of Natural Language Generation- Machine Translation: Problems in Machine Translation-Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages [9]

Lab Exercise:Buildingchunker

Information Retrieval and Tools

Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net-Stemmers-POS Tagger- Research Corpora.Tools:NLTK, Apache OpenNLP, SpaCy, AllenNLP,Gensim [9]

Lab Exercise:Process raw, unstructured digital texts using unsupervised machine learning algorithms

Total Hours 45

Textbook(s):

1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008.
2. Daniel Jurafsky, James H. Martin, “Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech”, Pearson Publication, 2014.

Reference(s):

1. Steven Bird, Ewan Klein and Edward Loper, Natural Language Processing with Pythonll, 1st Edition, OReilly Media, 2009.
2. Breck Baldwin, Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
3. Richard M Reese, Natural Language Processing with Javall, OReilly Media, 2015.
4. Nitin Indurkhya and Fred J. Damerau, Handbook of Natural Language Processing, 2nd Edition, Chapman and Hall/CRC Press, 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2							2	3	3	
CO2	3	3	3	3	2							2	3	3	
CO3	3	3	3	3	2							2	3	3	
CO4	3	3	3	3	2							2	3	3	
CO5	3	3	3	3	2							2	3	3	

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50 IT E45 – Big Data Framework

IT

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

Objective(s)	• To acquire basic concepts of Big Data, Characteristics of Big Data. • To explore the big data architecture and data patterns in different types of Databases. • To analyze the process involved in Data Acquisition, and Big Data Frameworks. • To comprehend the Real-time Analysis andInteractive Queuing. • To expertise in serving Databases, SQL, No SQL and Python Web Application Framework.
Course Outcomes	**At the end of the course, the students will be able to** CO1:Attain the concept of Big Data, Analytics Flow of Big Data, Analytics Patterns and Big Data Stack. CO2:Realize the Analytics Architecture Components, Design Styles, MapReduce Patterns and different types of Databases. CO3: Familiarize the Data Acquisition Considerations, Message Frameworks, Collection Systems and Batch Analysis. CO4: Comprehend the importance of Stream Processing, In-Memory Processing and Spark. CO5: Expertise the SQL, NoSQL , Python Web Application Framework Django and Data Visualization Framework and Libraries.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Big Data Concepts

Introduction to Big Data - Characteristics of Big Data - Domain Specific Examples of Big Data –Analytics Flow for Big Data - Mapping Analytics Flow to Big Data Stack - CASE Studies - Analytics Patterns -Big Data Stack - Setting up Big Data Stack - Hortonworks Data Platform - Cloudera CDH Stack - Amazon Elastic MapReduce (EMR) - Azure HDInsight. [9]

Lab Exercise :Install Hadoop in standalone mode and distributed mode and Create an application for setting up Big Data Stack.

Big Data Patterns

Analytics Architecture Components & Design Styles - MapReduce Patterns – NoSQL - Key-Value Databases - Document Databases - Column Family Databases - Graph Databases. [9]

Lab Exercise : Implement the word count MapReduce example in Python using the Streaming API API and Create an application to demonstrate to accept command line arguments and the design styles.

Big Data Frameworks

Data Acquisition Considerations - Publish - Subscribe Messaging Frameworks - Big Data Collection Systems - Messaging Queues - Custom Connectors – HDFS - Batch Analysis - Hadoop and MapReduce – examples – Pig – Case Study - Apache Oozie - Apache Spark - Apache Solr. [9]

Lab Exercise : The Inverted Index which provides a mapping from every word to the page on which that word occurs is at the heart of every search engine. This is one of the original use cases for MapReduce.Generating the inverted index using MapReduce

Realtime Analysis and Interactive Queuing

Stream Processing - Storm Case Studies - In-Memory Processing - Spark Case Studies - Spark SQL – Hive - Amazon Redshift - Google BigQuery. [9]

Lab Exercise : Create an application to demonstrate “shuffle” operations including grouping or aggregating the elements by a key using SPARK.

Serving Databases and Web Frameworks

Relational (SQL) Databases - Non-Relational (NoSQL) Databases - Python Web Application Framework – Django - Case Study: Django application for viewing weather data - Spark MLlib - H2O. Data Visualisation – Frameworks and Libraries. [9]

Lab Exercise : Create an application to demonstrate the following operation with NoSQL. Select data based on condition,Insert new items,Update existing items,Apply aggregation functions

Total Hours 45

Textbook(s):

1. ArshdeepBahga and Vijay Madisetti, “Big Data Science and Analytics – A Hands-on Approach”, ArshdeepBahga and Vijay Madisetti Publishers, 2016.
2. ZaighamMahmood, “Data Science and Big Data Computing – Framework and Methodologies”, Springer International Publishing, Switzerland, 2016.

Reference(s):

1. Donald Miner and Adam Shook, “MapReduce Design Patterns”, O’Reilly Publishers, USA, 2013.
2. Sridhar Alla, “Big Data Analytics with Hadoop 3”, Packt Publishing, Mumbai 2018.

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Passed in BoS Meeting held on 16/05/2023

Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

3.	Thomas Erl, WajidKhattak, Paul Buhler “Big Data Fundamentals: Concepts Drivers: Concepts, Drivers and Techniques”,Pearson,2016.
4.	Anil Maheswari, “Big Data”, McGraw Hill, 2nd Edition,2019.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3		1			1			2	3	1
CO2	3	2	3	2	3		1			1			2	3	1
CO3	3	2	3	2	3		1			1			2	3	1
CO4	3	2	3	2	3		1			1			2	3	1
CO5	3	2	3	2	3		1			1			2	3	1

K.S. Rangasamy College of Technology – Autonomous R2018

50 IT E46 - Blockchain Technology

IT

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

Objective(s)

- To identify the emerging techniques inBlockchain Technology
- To recognize the research challenges of bitcoin and crypto currency
- To realize the concepts of bit coin consenus and distributed consensus of Blockchain
- To apply the concepts of Hyper ledger fabric and Etherum model
- To learn Block Chain applications and its tools

Course Outcomes

At the end of the course, the students will be able to

CO1: Acquire Knowledge on emerging techniques inBlockchain Technology
CO2: Assess the research challenges ofbitcoin and crypto currency in various domain
CO3: Explore the concepts of bit coinconsenus and distributedconsensusofBlockchain
CO4: Apply Hyper ledger fabric and Etherum model for Blockchain applications
CO5: Implement Blockchainapplicationsin emerging areas

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Blockchain

Blockchain- Public Ledgers, Blockchain as Public Ledgers -Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions-Distributed Consensus, The Chain and the Longest Chain - Cryptocurrency to Blockchain 2.0 – Permissioned Model of Blockchain, Cryptographic –Hash Function, Properties of a hash function-Hash pointer andMerkle tree [9]

Lab Exercise: Check the integrity of data using SHA-256

Bitcoin and Cryptocurrency

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments-Consensus in a Bitcoin network [9]

Lab Exercise:Study the use of FORTH cryptocurrency protocol

Bitcoin Consensus and Distributed Consensus

Bitcoin Consensus, Proof of Work (PoW)- HashcashPoW ,BitcoinPoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts-Consensus models for permissioned blockchain-Distributed consensus in closed environment Paxos-Byzantine Problem - Byzantine fault tolerant system [9]

Lab Exercise: Detect fault or malicious nodes using Byzantine fault tolerant

Hyper Ledger Fabric and Etherum

Architecture of Hyperledger fabric v1.1-Introduction to hyperledger fabric v1.1, chain code-Ethereum:Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Smart contracts, TruffleDesign and issue Crypto currency, Mining, DApps [9]

Lab Exercise:Analyse the use of hyperledger, Gas, Solidity, Smart contracts

Blockchain Applications and Tools

Internet of Things-Medical Record Management System-Blockchain in Government and Blockchain Security-Blockchain Use Cases – Finance.Tools: Solidity,Geth,Mist,Solc,RemixIDE,BlockchainTestnet. [9]

Lab Exercise: simple application to test the value of a coin using Testnet

Total Hours 45

Text book(s):

1.	Bashir ,Imran, “Mastering Blockchain : Deeper Insights into Decentralization,Cryptography , Bitcoin and Populat Block Chain Frameworks”, 2017.
2.	Josh Thompson, “Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming”, Create Space Independent Publishing Platform, 2017.
Reference(s) :	
1.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, ISBN: 9780691171692, Princeton University Press,2016.
2.	Joseph Bonneau et al, “SoK: Research perspectives and challenges for Bitcoin and cryptocurrency”, IEEE Symposium on security and Privacy,2015.
3.	Gavin Wood, Andreas M. Antonopoulos, “Mastering Ethereum”, ISBN: 9781491971949, O'Reilly Media, Inc.,2018.
4.	S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, “Blockchain Technology: Cryptocurrency and Applications”, Oxford University Press, 2019.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	2							2	3	3	
CO2	3	2	2	3	2							2	3	3	
CO3	3	2	2	3	2							2	3	3	
CO4	3	2	2	3	2							2	3	3	
CO5	3	2	2	3	2							2	3	3	

K.S.Rangasamy College of Technology – Autonomous R2018

50 IT E47 - Ontology and Semantic Web

IT

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

Objective(s)

- To impart the knowledge of semantic web and semantic heterogeneity
- To classify the word of objects and its classes
- To analyze the structure of formal upper ontologies
- To represent the ontology framework and its properties
- To identify advanced issues in ontology platform

Course Outcomes

At the end of the course, the students will be able to

CO1: Identify the dream of interoperatability and semantic heterogeneity
CO2: Analyze the complex objects, subclasses and subproperties of ontologies
CO3: Illustrate the structure and life cycle of formal upper ontologies
CO4: Represent the Resource Definition Framework and Web Ontology Language
CO5: Examine the advanced issues in using ontology platform and ontology server

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction: The Dream of Interoperability - A Book-Shopping Bot - Need to Support an Agent - Information Systems – Operation of Institutional World - Semantic Heterogeneity: Federated Databases - Semantic Heterogeneity - Semantic Heterogeneity Is the Norm - Need of an Ontology Representation Language - Information Retrieval Ontology - Tic-Tac-Toe - Standard Industrial Classification. [9]

Lab Exercise: Write a Program to solve Tic-Tac-Toe Problem in Ontology.

Complex Objects, Subclasses and Subproperties

A World of Objects - Ontologies Versus Models - Complex Objects- Representation of Identity and Unity in a Single Information System - Interoperating Systems - Comment on the Examples - Summary of Identity and Unity- Subclasses and Subsumption - Defined Classes Versus Declared Classes - Interoperation Example - A More Complex Example - Subproperties - Commentary on the Examples. [9]

Lab Exercise: Write a Case Study about Complex Objects, Subclasses and Subproperties

Formal Upper Ontologies

Structures so Far Not Enough - Upper Ontologies - BWW System - Dolce System - Comparison of BWW and Dolce Ontologies - Benefits of Using a Formal Upper Ontology - Application to the Examples - Quality of Ontologies - Gruber’s Design Principles - Ontology Lifecycle - Ontology Engineering - Ontology Application Types. [9]

Lab Exercise: Write an script for plain HTTL versus XML

Representations of Ontologies RDFS - Representation in Bare XML - Resource-Definition Framework (RDF) - RDF Schema - Web Ontology Language (OWL) - Metamodel of OWL - OWL Properties – Names - Class Descriptions - Defined Subclasses for the Airlines Ontology - Ontology as an Engineered Object - Flavours of OWL. Lab Exercise: Write an algorithm for Subclasses for the Airlines Ontology	[9]
Advanced Issues Capabilities of Ontology Platforms - Avoiding Attributes - Bulk Classes - Concept Versus Representational Classes – Dimension - Representing Mereological Structures - N-Ary Associations - Extent-Descriptive Metaclasses - Predicates - Predicates and Their Uses - Abstract Syntax for CL - CL Beyond OWL - Connecting OWL and CL - Topic Maps - Using an Ontology: The Ontology Server. Lab Exercise: Write an Abstract Syntax for CL, CL Beyond OWL,Connecting OWL and CL	[9]
Total Hours	**45**
Text book(s):	
1.	Robert M. Colomb, “Ontology and the Semantic Web”, IOS Press, Amsterdam, Netherland, 2017
2.	DhanaNandini,”Semantic Web and Ontology”, DhanaNandini& bookboon.com, 2014
Reference(s):	
1.	John Davies and Rudi Studer, “Semantic Web Technologies”, John Wiley & Sons Publishers, England, 2006
2.	Tharam S. Dillon Elizabeth Chang, “Advances in Web Semantics I - Ontologies, Web Services and Applied Semantic Web”, Springer International Publishing, Germany, 2008
3.	Dieter Fensel and HolgerLausen, “Enabling Semantic Web Services”, Springer International Publishing, Germany, 2007
4.	Grigoris Antoniou and Paul Groth,”A Semantic Web Primer”, MIT Press Publishing, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2		1			1			2	3	1
CO2	3	3	3	2	2		1			1			2	3	1
CO3	3	3	3	2	2		1			1			2	3	1
CO4	3	3	3	2	2		1			1			2	3	1
CO5	3	3	3	2	2		1			1			2	3	1

K.S.RangasamyCollegeof Technology– Autonomous R2018							
50 IT E51 - Business Intelligence							
IT							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100
Objective(s)	• 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						
Course Outcomes	**At the end of the course, the students will be able to** CO1: Design and implement OLTP, OLAP, data warehouse and BI concepts. CO2: Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data. CO3: Outline the definitions, concepts, information visualization and techniques of multi-dimensional data modeling. CO4: Design an enterprise dashboard using open source/MS Office and decision making CO5: Apply big data technologies in business intelligence using cloud computing and creating a new opportunity for entrepreneurship for analytics						
Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.							
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 Infrastructure Components - Impact of BI - BI Users - BI Roles and Responsibilities - Business Intelligence Applications - Best Practices BI/DW							[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 - SPSS Tools	[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**

Textbook(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.	Elizabeth Vitt, Michael Luckevich, StaciaMisner, “Business Intelligence: Making Better Decisions Faster”, Microsoft Press, 2002.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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			

K.S. Rangasamy College of Technology – Autonomous R2018

50 IT E52 - Big Data Analytics

IT

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

Objective(s

- To know the fundamental concepts of big data and analytics
- To introduce big data analytics technology and tools including MapReduce and Hadoop.
- To understand the importance of mining data streams and social network graphs.
- To learn different mining algorithms and recommendation systems for large volumes of data
- To know the concepts of data pre processing for huge amount of data

Course Outcomes

At the end of the course, the students will be able to

CO1: Reframe a business challenge as an analytics challenge

CO2: Compare Hadoop, MapReduce and Locality-Sensitive Hashing for enterprise-class scalabili and reliability

CO3: Apply Clustering techniques for mining larger datasets

CO4: Design an efficient recommendation system

CO5: Handle large dataset using dimensionality reduction technique

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours requi for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction Characteristics of Big data - Data in the Warehouse and Data in Hadoop – Big Data Use cases: Patterns for Big Data Deployment – IT for IT Log Analytics - The Fraud Detection Pattern – Social Media Pattern – The Call Center Mantra – Risk: Patterns for Modeling and Management – Big Data and the Energy Sector	[9]
Hadoop, MapReduce and the New Software Stack	[9]

The History of Hadoop – Components of Hadoop – Application development in Hadoop - Getting data into Hadoop – Other Hadoop Components - Distributed File Sytems - MapReduce - Algorithms using MapReduce - Extensions to MapReduce - The Communication Cost Model - Complexity Theory for MapReduce - Finding Similar Items: Applications of Near-Neighbor Search - Shingling of Documents - Locality-Sensitive Hashing for Documents **Clustering** Introduction to Clustering Techniques - Hierarchical Clustering - K-means Algorithms - The CURE Algorithm - Clustering in Non-Euclidean Spaces - Clustering for Streams and Parallelism	[9]
Recommendation Systems and Mining Social-Network Graphs A Model for Recommendation Systems - Content-Based Recommendations - Collaborative Recommendation-Knowledge Based Recommendation- Hybrid RecommendationApproaches.Collaborative Filtering -Dimensionality Reduction - Social Networks as Graphs - Clustering of Social-Network Graphs - Direct Discovery of Communities - Partitioning of Graphs - Finding Overlapping Communities – Simrank- Data Visualization tool like kibana(To explore)	[9]
Dimensionality Reduction and Large-Scale Machine Learning Eigenvalues and Eigenvectors of Symmetric Matrices - Principal-Component Analysis - Singular-Value Decomposition - CUR Decomposition - The Machine-Learning Model - Perceptrons - Support-Vector Machines - Learning from Nearest Neighbors - Comparison of Learning Methods- Memory Databases like Redis (case studies)	[9]
Total Hours	**45**

Text book(s):	
1.	Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGraw-Hill, 2015.
2.	Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.
Reference(s) :	
1.	Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.
2.	Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3.	Peter Bühlmann, Petros Drineas, Michael Kane, Mark van der Laan, "Handbook of Big Data", CRC Press, 2016.
4.	EMC Education Services, “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley publishers, 2015

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	3									2	2
CO2	2	2	3	2	3								2	3	2
CO3	2	2	3	3	3								2	3	
CO4	2	2	2	3	3								2		3
CO5	2	2	3	3	3								2		3

K.S.Rangasamy College of Technology – Autonomous R2018								
50 IT E53 - Deep Learning								
IT								
Semester	Hours/Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
VIII	2	0	2	60	3	50	50	100
Objective(s)	• To understand the basic principles of Neural Networks and Machine learning • To learn the basic concepts of Deep learning • To gain knowledge about Convolutional Neural Networks • To familiarize the different deep learning architectures • To realize the applications of Deep Learning							

Course Outcomes	**At the end of the course, the students will be able to** CO1: Realize the basics of neural networks and machine learning CO2: Explain the fundamentals of deep learning implementation CO3: Design and implement convolutional neural network to solve real world problems CO4: Analyze different deep learning architectures CO5: Explore the suitable method of Deep Learning in different applications

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Basics of Neural Networks

Basic concept of Neurons –McCulloch Pitts Neuron, Thresholding logic - Perceptron learning Algorithm – Multilayer Perceptrons - Machine Learning-Supervised and Unsupervised learning-Regression and Classification-K-Means Clustering [9]

Lab Exercise : Setting up the neural network environment and study the libraries used for deep learning

Introduction to Deep Learning [9]

History of Deep learning - Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Momentum based and Nesterov Accelerated Gradient Descent – Regularization – Dropout

Lab Exercise : Build an artificial neural network model for regression applications

Convolutional Neural Networks [9]

Convolutional Neural Networks Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning – LeNet ,AlexNet , GoogLeNet, ResNet

Lab Exercise : Build a convolutional neural network model for computer vision applications

Deep Learning Architectures [9]

Long Short Term Memory, Gated Recurrent Units, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising –Contractive- VariationalAutoencoders – Adversarial Generative Networks

Lab Exercise : Build a recurrent neural network model for stock price prediction

Applications of Deep Learning [9]

Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Sentence Classification using Convolutional Neural Networks

Lab Exercise : Design and build a complete deep learning model for an application

Total Hours 45

Text book(s):

1.	Ian Good Fellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2.	Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.

Reference(s):

1.	Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
2.	RagavVenkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press,2018
3.	Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.
4.	Seth Weidman, “Deep learning from scratch: Building with Python from first principles ”,O’Reilly, 2019

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3			1	1	1	1	1	1	1	1
CO2	2	2	3	3	3			1	1	1	1	1	1	1	1
CO3	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1
CO4	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1
CO5	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1

K.S.RangasamyCollegeof Technology– Autonomous R2018				
50 IT E54 - Big Data Security				
IT				
Semester	Hours / Week	Total hrs	Credit	Maximum Marks

	L	T	P		C	CA	ES	Total
VIII	3	0	0	45	3	40	60	100

Objective(s)	• To enhance and exposed to bigdata and scaling up new techniques focusing on industry applications. • To identify the different ways of data analysis, techniques for mining data stream and visualization techniques. • Be familiar with practice bigdata analytics and modern computing bigdata technologies with more security. • To identify the different Protection and Privacy Using Big Data. • To learn various Encryption and security measures
Course Outcomes	**At the end of the course, the students will be able to** CO1: Analyse the statistical analysis methods and challenges in big data environment CO2: Explore tools and practices for working with modern data analytics technologies like hadoop, Mongodb, Cassandra and Hbase. CO3: Implement the different security theories, privacy, protection methods for bigdata CO4: Recognize the importance of security and storage of big data and analyze it feasibilities and obstacles. CO5: Classify the various techniques of encryption methods for bigdata platform

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to Big Data

Evolution to Big Data – Best Practices for Big Data Analytics – Big Data Characteristics – The Promotion of the Value of Big Data - Validating – Big Data Use Cases – Characteristics of Big Data Applications – Perception and Quantification of Value – Understanding Big Data Storage – A General Overview of High Performance Architecture – HDFS – Map Reduce and YARN – Map Reduce Programming Model [9]

Big Data Tools and Platforms

Technical Concepts and Patterns :Big Data Cluster - Big Data Storage Concepts – Big Data Computing and Retrieval Concepts – Big Data Service Management Concepts - Hadoop Ecosystem - Key Components of Hadoop Ecosystem - Hadoop Distributions - Hadoop Ecosystem on Cloud - NoSQL Databases - MongoDB - Cassandra - Hbase - NoSQL Databases in Cloud [9]

Security Theories and Practices for Big Data

Introduction - Confidentiality of Bigdata - Protection with Cryptography for General Purpose Processing - Protection with Cryptography for Special Applications - Protection for Query - Protection with Hardware - Privacy of Big Data - Protection using k-Anonymity - Protection Using Differential Privacy -Protection on User Side Integrity of Big data - Classical Digital Signature and MAC for Processing IntegrationProtection - Homomorphic Signature - Big Data Query Integrity Protection [9]

Big Data Storage Security

Introduction - System Architecture for Big Data Storage - Cyber Attacks for Big Data Storage -Security Fundamentals - Data Deduplication - Convergent Encryption - Proof of Ownership - Key Management - Randomized Solution - Query Over Encrypted Data [9]

Security and Privacy for Big Data

Introduction - Data Encryption - Searchable Encryption **-**Structured Encryption -Homomorphic Encryption - Order Preserving Encryption - Privacy Preservation **-** Trust Management **-** Security for Big Data Platforms [9]

Total Hours 45

Textbook(s):

1. David Loshin, “Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL and Graph”,Morgan Kaufmann/Elsevier Publishers 2013.
2. Shui Yu, Song guo, “Big Data Concepts, Theories and Applications” ,Springer International Publishing, 2017

Reference(s):

1. ShibakaliGupta,Indradip Banerjee and Siddhartha Bhattacharyya,“Big Data security”, De Gruyter Frontiers in computational Intelligence,2019
2. Kevin Mitnick, ”The art of invisibility”, Little Brown and company,Newyork,2017
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics”, John Wiley & sons, 2012.
4. Shui Yu, Song Guo “ Big Data Concepts, Theories, and Applications”, Springer,2016.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3			2								2	3	
CO2	2	3	2	2	3								2	3	
CO3	3	3	2	2	3								2	3	

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Approved in Academic Council Meeting held on 03/06/2023 **BoS Chairman Signature**

CO4	3	3	2	2	3								2	3	
CO5	2	3			2								2	3	

K.S.Rangasamy College of Technology – Autonomous R2018

50 IT E55- Ethical Hacking

IT

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

Objective(s)

- To understand and analyze information security threats and countermeasures
- To perform security auditing and testing
- To understand issues relating to ethical hacking
- To study and employ network defense measures
- To understand penetration and security testing issues

Course Outcomes

At the end of the course, the students will be able to

CO1:Demonstrate and analyze Information security threats & countermeasures
CO2:Explore the security auditing and testing
CO3:Solve the issues relating to ethical hacking
CO4:Recognize the employ network defense measures
CO5:Examine the penetration and security testing issues

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Ethical Hacking Overview and Vulnerabilities

Understanding the importance of security, Concept of ethical hacking and essential Terminologies Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Phases involved in hacking [9]

Lab Exercise: Study the use of network reconnaissance tools like WHOIS, dig, traceroute, nslookup to gather information about networks and domain registrars.

Footprinting& Port Scanning [9]

Foot printing - Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase. Port Scanning - Introduction, using port scanning tools, ping sweeps, Scripting Enumeration-Introduction, Enumerating windows OS & Linux

Lab Exercise: Download and install nmap. Use it with different options to scan open ports, perform OS fingerprinting, do a ping scan, tcp port scan, udp port scan, etc.

System Hacking [9]

Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers, Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.

Lab Exercise: Study of packet sniffer tools like wireshark, ethereal, tcpdump etc. Use the tools to do the following

1. Observer performance in promiscuous as well as non-promiscous mode.

2. Show that packets can be traced based on different filters. Study of packet sniffer tools like wireshark, ethereal, tcpdump etc.

Hacking Web Services and Session Hijacking [9]

Web application vulnerabilities, application coding errors, SQL injection into Back-end Databases, cross-site scripting, cross-site request forging, authentication bypass, web services and related flaws, protective http headers Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session Hijacking Tools

Lab Exercise: Isolate the different aspects of the SQL Injection and execute the selected code.

Hacking Wireless Networks [9]

Introduction to 802.11,Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks

Lab Exercise: Using Wireshark tool to review the network traffic to confirm the presence of malicious activity.

Total Hours 45

Text book(s):	
1.	RafayBaloch, “Ethical Hacking and Penetration Testing Guide”, CRC Press, 2014.
2.	Dr. Bruce V.Hartley,” Ethical Hacking: The Value Controlled Penetration Tests”,CISSP Privisec,Inc.,2003
Reference(s):	
1.	Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010
2.	RajatKhare, "Network Security and Ethical Hacking", Luniver Press, 2006
3.	Thomas Mathew, "Ethical Hacking", OSB publishers, 2003
4.	Alan T. Norman,”Computer Hacking Beginners Guide”,Kindle Edition,2014

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	2	2	2	2		2	3	3	2
CO2	3	3	3	3	3	2		2	2	3		2	3	3	2
CO3	3	3	3	3	3			3	2	3		2	3	3	3
CO4	3	3	3	3	3			3	2	2		2	3	3	3
CO5	3	3	3	3	3			2	2	2		2	3	3	2

K.S.Rangasamy College of Technology – Autonomous R2022

50 IT E56 – Ubiquitous Computing

IT

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

Objective(s)

- This course provides students with an opportunity to explore the research issues in ubiquitous computing and its close relative, pervasive and mobile computing.
- Many traditional areas of computer science and engineering are impacted by the constraints and demands of ubiquitous computing.

Course Outcomes

At the end of the course, the student will be able to

CO1: Describe the characteristics of pervasive computing applications including the basic computing application problems, performance objectives and quality of services, major system components and architectures of the systems.

CO2: Analyze the strengths, problems and limitations of the current tools, devices and communications for pervasive computing systems.

CO3: Recognize the different ways that humans will interact with systems in a ubiquitous environment and account for these accordingly.

CO4: List and exemplify the key technologies involved in the development Ubicomp systems.

CO5: Develop an attitude to identify and propose solutions for security and privacy issues, explore the trends and problems of current ubiquitous computing systems using case studies.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hoursindicated.

Introduction toUbiquitousComputing Concept of Distributed Computing, Mobile Computing, Pervasive Computing, Wearable Computing, Modeling the Key Ubiquitous/Pervasive Computing Properties, Mobile Adaptive Computing , Mobility Management andCaching.	[9]
PervasiveComputingDevices Smart Environment: CPI and CCI Smart Devices: Application and Requirements, Device Technology and Connectivity, Human Computer Interaction. Wearable computing, Glass and Augmented Reality, Eye-Tracking, Digital Pen and Paper, Mobile social networking & crowd sensing, Event based social network, Mobile affective computing: Human Activity and Emotion Sensing, Health Apps, Perfecto Web and Mobile Application Testing.	[9]
HumanComputerInteraction Explicit HCI, Implicit HCI, User Interface and Interaction for four hand-held widely used devices, Hidden UI via basic smart devices, Hidden UI via wearable and Implanteddevices, Human centered design, usermodels,Mobile HCI.	[9]
Middleware forPervasive Computing Adaptive middleware, Context aware middleware, Mobile middleware, Service Discovery, MobileAgents.	[9]
Security inPervasiveComputing Security and Privacy in Pervasive Networks, Experimental Comparison of Collaborative Defense Strategies	[9]

for NetworkSecurity.Location in ubiquitous computing: Personal assistants, Location aware computing, Location tracking, Architecture, Location based service and applications, Location based social networks (LBSN), LBSN Recommendation. Context-aware computing: Context and Context-aware Computing, Issues and Challenges, Developing Context-aware Applications, System Architecture, Privacy and security in ubiquitous computing, Energy constraints in ubiquitous computing.	
Total Hours	45

Text Books:

1.	Stefan Poslad, "Ubiquitous Computing, Smart devices, environment and interaction",Wiley, 2009.
2.	Frank Adelstein Sandeep K. S. Gupta Golden G. Richard III Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill, 2005.

Reference(s):

1.	JochenBurkhardt, Horst Henn, Stefan Hepper, Klaus Rindtor, Thomas Schaeck, "Pervasive Computing", Pearson, Eighteenth Impression, 2014.
2.	JochenBurthardt et al, "Pervasive Computing: Technology and Architecture of Mobile Internet Applications", Pearson Education, 2003.
3.	Mohammad s. Obaidat et al, "Pervasive Computing and Networking", John Wiley,2011.
4.	John Krumm "Ubiquitous Computing Fundamentals", CRC Press, 2010.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3										3	2	
CO2	3	2	3	2	2	2	2	2					3	2	
CO3	3	2	3	2		2	2	2					3	2	
CO4	3	2	3										3	2	
CO5	3	3	2	2								2	3		

K.S.RangasamyCollegeof Technology– Autonomous R2018

50 IT E57 - Web of Things

IT

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

Objective(s)

- To impart the knowledge of Internet of Things and Web of Things
- To analyze the importance of javascript in Web of Things
- To classify network topologies and build Network of Things
- To access and implement Web of Things
- To discover and secure Web of Things

Course Outcomes

At the end of the course, the students will be able to

CO1: Illustrate the basic knowledge of Internet of Things and Web of Things in real world
CO2: Analyze the significance of Javascript and Raspberry Pi in Web of Things
CO3: Build the network of things and its network protocols
CO4: Represent the Integration pattern and building of web of Things
CO5: Examine the security, Authentication and access control in Web of Things

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Basics of the IoT and the WoT

Internet of Things to the Web of Things - Enter the Web of Things - Use cases- why connected objects? - The Web of Things - A supercharged Internet of Things - Meet a Web of Things device - Browse a device on the Web of Things - Polling data from a WoT sensor - Act on the real world - Tell the world about your device - Create your first physical mashup – Elastic App Search Crawler. [9]

JavaScript for the Web of Things

The rise of JavaScript: from clients to servers to things - Introduction to Node.js - Modularity in Node.js - Understanding the Node.js event loop - Getting started with asynchronous programming - The world of embedded devices - Set up your first WoT device- Raspberry Pi - Installing Node.js on the Raspberry Pi - Connecting sensors and actuators to your Pi – ES6 and TypeScript Basics. [9]

Building the Network of Things

Connecting Things: Network topologies, Network classification models - Networking protocols for Things: Spatial considerations, Internet protocols and the IoT, IoT personal area networks , IoT wide [9]

area networks - Application protocols for Things: ZigBee and Bluetooth application stacks , Apple Home Kit and Google Weave, Message Queuing Telemetry, Transport , Constrained Application Protocol - The Web of Things architecture.

Building the Web of Things

Access: Web APIs for Things: Devices, resources and web Things - Beyond REST: the real-time Web of Things - Implementing web Things: Connecting devices to the web - Direct integration pattern - Gateway integration pattern - Cloud integration pattern [9]

Discovering and Securing the Web of Things

Describe and discover web Things: The findability problem - Discovering Things - Describing web Things - The Semantic Web of Things - Securing and sharing web Things: Securing Things - Authentication and access control - The Social Web of Things [9]

Total Hours 45

Textbook(s):

1.	Dominique D. Guinard Vlad M. Trifa, "Building the Web of Things with examples in Node.Js and Raspberry Pi ", Manning Publications Co., Shelter Island, USA, 2016
2.	Quan Z. Sheng and YongruiQin,"Managing the Web of Things", Morgan Kaufmann Publishers, Cambridge, MA, USA, 2017

Reference(s):

1.	Ning Zhong and Jianhua Ma,"Wisdom Web of Things", Springer International Publishing, Switzerland, 2016
2.	HakimaChaouchi, "The Internet of Things - Connecting Objects to the Web", Wiley Publishers, USA, 2010
3.	Cuno Pfister, "Getting Started with the Internet of Things", O'Reilly Publishing, USA, 2011
4.	Francis dacosta. "Rethinking the Internet of Things", Apress Publishers, USA, 2013

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2		1			1			2	3	1
CO2	3	3	3	2	2		1			1			2	3	1
CO3	3	3	3	2	2		1			1			2	3	1
CO4	3	3	3	2	2		1			1			2	3	1
CO5	3	3	3	2	2		1			1			2	3	1

K.S.Rangasamy College of Technology - Autonomous R2018

50 IT L01 - E-Commerce

IT

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

Objective(s)

- To enable the students to know the basics of E-commerce
- To understand the technology infrastructure in E-commerce
- To obtain details of business applications in E-commerce
- To acquire knowledge in E-commerce payment and security
- To gain information of legal and privacy issues in E-commerce

Course Outcomes

At the end of the course, the students will be able to

CO1: Examine the impact of economic forces and business models in E-Commerce

CO2: Construct the hardware and software technology infrastructure in E-Commerce

CO3: Compile the consumer oriented and business oriented applications in E-Commerce

CO4: Integrate the digital payment system and its security in E-Commerce

CO5: Appraise the legal, ethical, privacy issues and its protection methodologies in E-Commerce

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Electronic commerce and physical commerce - Economic forces – advantages – myths - business models [9]

Technology Infrastructure

Internet and World Wide Web, Internet protocols - FTP, intranet and extranet - cryptography, information publishing technology- basics of web server hardware and software. [9]

Business Applications

Consumer oriented E-commerce – E- tailing and models - Marketing on web – advertising, e-mail marketing, e-CRM, Business oriented E-commerce – E-Government, EDI on the internet, SCM, Web Auctions, Virtual communities and Web portals [9]

E-Commerce Payments and Security

E payments - Characteristics of payment of systems, protocols, E-cash, E- check and Micro payment systems [9]

Legal and Privacy Issues in E- Commerce

Legal, Ethics and privacy issues – Protection needs and methodology – consumer protection, cyber laws, contracts and warranties. Taxation and encryption policies [9]

Total Hours 45

Text book(s):

1.	Hentry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, "E-Commerce – Fundamentals and Applications", Wiley India Pvt Ltd, 2007.
2.	Gary P. Schneider, "Electronic Commerce, Thomson course technology", Fourth Annual Edition, 2007.

Reference(s):

1.	Bharat Bhasker, "Electronic Commerce – Frame work technologies and Applications", Third Edition. Tata McGrawHill Publications, 2008.
2.	Kamlesh K.Bajaj and Debjani Nag, "Ecommerce- the cutting edge of Business", Tata McGraw Hill Publications, 2008.
3.	Efraim Turban et al," Electronic Commerce –A Managerial Perspective", Pearson Education Asia, 2006.
4.	http://docs.opencart.com/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	3	3	1	1	2					3	3	3
CO2	2	2	3	3	3	1	1	2					3	3	3
CO3	2	2	3	3	3	1	1	2					3	3	3
CO4	2	2	3	3	3	1	1	2					3	3	3
CO5	2	2	3	3	3	1	1	2					3	3	3

K.S.Rangasamy College of Technology - Autonomous R2018

50 IT L02 - Web Design

IT

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

Objective(s)

- To enhance the knowledge of how to develop a Web page using HTML
- To classify the various style and dimensions of CSS
- To design the web page usingJavaScript
- To design the web page using DOM
- To implement the various approach of databaseconnectivity

Course Outcomes

At the end of the course, the students will be able to

CO1: Identify different types of HTML tags, their functionality and attributes and learn the basics of web services

CO2: Classify CSS to control the appearance of web pages and denote the background elements and media types

CO3: Incorporate JavaScript variables, operators and functions in web pages and manipulate HTML forms to validate user inputs

CO4: Demonstrate various JavaScript object models and create a web pages with dynamic style using JavaScript and DOM

CO5: Demonstrate the database connectivity and simple PHP application program using web Server

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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", 5th Edition, (Harvey & Paul) Deitel& Associates, 2012.
2.	"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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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									

K.S.Rangasamy College of Technology - Autonomous R2018

50 IT L03 – Python Programming

IT

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

Objective(s)
- To know basic programming in Python
- To understand modules and handle exceptions
- To learn object oriented programming concepts
- To connect database and network through programming
- To create layouts using graphical tools

Course Outcomes
At the end of the course, the students will be able to
CO1:Apply the basics of Python programming for problem solving
CO2:Develop programs using package and handling exceptions
CO3:Implement object oriented programming concepts using Python
CO4:Design layouts with GUI toolkits using Tkinter
CO5:Deploy database management for implementing DB connectivity and expel network Programming

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

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. R.Nageswara Rao “Core Python Programming”, DreamTechPress,Second Edition,2018

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2							2	3	3	3
CO2	3	3	3	2	2							2	3	3	3
CO3	3	3	3	2	2							2	3	3	3
CO4	3	3	3	2	2							2	3	3	3
CO5	3	3	3	2	2							2	3	3	3

K.S.Rangasamy College of Technology - Autonomous R2018

50 IT L04 - Multimedia Technologies

IT

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

Objective(s)

- To expose students to the various aspects of multimedia in relation to appropriate and acceptable design techniques used within thesemedia.
- To identify both theoretical and practical aspects in designing multimedia systems surrounding the emergence of multimedia technologies using softwaretechnologies.
- To identify a range of concepts, techniques and tools for creating and editing the interactive multimediaapplications.
- To classify the various web design software of multimedia
- To demonstrate the various animation software of multimedia.

Course Outcomes

At the end of the course, the students will be able to

CO1: Classify multimedia tools, file formats, color models and MIDI.
CO2: Apply various compression techniques for multimedia data.
CO3: Analyze multimedia network communications and its applications.
CO4: Design web pages using web design and editing software.
CO5: Use animation software for modeling and VRML for visual effects.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction [9]

Multimedia and Hypermedia - World Wide Web - Overview of Multimedia software tools - Multimedia authoring – Graphics and Image data representations: Data types, Popular file formats - Color in Image and Video: Color Science, Color models in Images - Color models in video - Basics of Digital audio: MIDI. **Multimedia Data Compression** Lossless Compression algorithms: Run-length coding, Variable length coding, Arithmetic coding, Lossless Image compression - Lossy Compression algorithms: Quantization - Basic video compression techniques: Video compression based on motion compensation, H.261: Intra-frame coding and Inter-frame coding - Basic audio compression techniques: vocoders. [9] **Multimedia Communication and Retrieval** Computer and multimedia networks: Multiplexing technologies - Multimedia network communications and applications: Quality of multimedia data transmission, Multimedia over IP - Multimedia over wireless networks. [9] **Graphics Design Programs and Web Design Software** Graphics design Programs: Adobe Photoshop CS3, CorelDraw and PageMaker - Web design software: DreamWeaverCS3 and Flash CS3 - Editing software: Adobe Premier Pro, Adobe after effects. [9] **Animation Software** Introduction to animation - Uses of animation - Computer-based animation - 3D animation - Animation software: 3D Studio Max 9.0, Maya and Sound Forge - Virtual reality - VR applications - VRML. [9] **Total Hours 45**	
Text book(s):	
1.	Ze-Nian Li and Mark S. Drew, “Fundamentals of Multimedia”, Pearson Education, 2004.
2.	Ramesh Bangia, “Professional in Multimedia”, Firewall Media, Lakshmi Publications, 2015.
Reference(s):	
1.	Ranjan Parekh, “Principles of Multimedia”, 2nd edition, Tata McGraw-Hill, 2013.
2.	Tay Vaughan, “Multimedia: Making it work”, 7th edition, Tata McGraw-Hill, 2008.
3.	Tay Vaughan,”Multimedia: Making it Work”, 9th edition, Tata McGraw-Hill, 2017.
4.	Prabhat K.Andleigh, Kiran Thakrar,”Multimedia Systems Design”,1st Edition,Pearson Education,2015

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2								3		
CO2	3	2	3	2	2				3	2				3	
CO3	3	3	2			2	2	2	2	2		2			3
CO4	3	2	2					2	2	2					
CO5	3	2	2	2	3				2	2					

K.S.RangasamyCollegeof Technology– Autonomous R2018							
50 IT E34 / 51 IT L05 - Mobile Application Development							
IT							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
	2	0	2	60	3	50	50	100
Objective(s)	• 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						
Course Outcomes	**At the end of the course, the students will be able to** CO1:Examine the development environment to build mobile apps using emulator CO2:Appraise the user interface resources and activities to create mobile apps CO3:Review the various building blocks of mobile apps to establish the connection with database CO4:Explore the graphics and animation techniques with multimedia for mobile app developmentusing various sensors CO5:Recognize the process of testing an android app along with the method of versioning, signing, packaging and publishing.						

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.	
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, a case study on Mobile app development [9] **Lab Exercise :** Setting Up the Development Environment and run an app on the Android Emulator **Building Blocks of Mobile Apps** App user interface designing – mobile UI resources (Layout,UIelements,Draw-able, Menu), Activity-states and life cycle, interaction amongst activities, App functionality beyond user interface - Threads, Async task, Services [9] **Lab Exercise :** Develop an app that uses GUI components and Layout **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) [9] **Lab Exercise :** Develop an app that makes use of database **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) [9] **Lab Exercise :** Create an app to play the Audio and Video clips **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, MonkeyTalk - Versioning, signing and packaging mobile apps, distributing apps on mobile market place [9] **Lab Exercise :** Design an app that creates alarm clock and distribute it on market place **Total Hours 30+15(Practical) 45**	
Textbook(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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

K.S. Rangasamy College of Technology – Autonomous R2018								
50 IT L06 – Programming in Data Structures								
IT								
Semester	Hours / Week			Total hrs	Credit	Maximum Marks		
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100
Objective(s)	• To introduce the concept of arrays, structures, pointers and recursion. • To study stack, queue and linked list concepts. • To study trees, representation of trees, traversal techniques. • To be familiar with several sorting and searching algorithms. • To be familiar with some graph algorithms such as shortest path and minimum spanning tree.							
Course Outcomes	**At the end of the course, the students will be able to** CO1: Review the fundamental concepts of C programming language CO2: Express the concept of Linear data structures, applications and its implementations							

	CO3: Appraise the knowledge of Tress with its operations CO4: Recognize the concept of Sorting, Searching and its types CO5: Apply Shortest Path and Minimum Spanning Tree algorithms to solve real world applications.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction to C- Data types – variables-Operators and Expression-Control Statements-Arrays and String-Function and Structure-Pointers [9]

Linear Data Structures

Abstract Data Type(ADT) List –array implementation of list, Linked list –Singly linked list, Doubly linked list, Circular linked list- Stack ,Queue [9]

Trees

Binary Trees - The Search Tree ADT - Binary Search Trees - AVL Trees - Tree Traversals - B Tree [9]

Sorting and Searching

Insertion sort - Shell sort – Merge sort – Quick sort – Quick sort – Heap sort- Sequential search – Binary search [9]

Graphs

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm - Minimum Spanning Tree – Prim's Algorithm, Kruskal's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity [9]

Total Hours 45

Text book(s):

1. YashavantKanetkar, "Let Us C: Authentic Guide to C Programming Language", 17th Edition, BPB Publication, 2020.
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia,2008.

Reference(s) :

1. E. Balagurusamy, "Programming in Ansi C", 6th edition, Tata McGraw Hill Publication, 2012.
2. Robert L. Kruse, Bruce P. Leung Clovis L.Tondo, "Data Structures and Program Design in C", Pearson Education, 2000 / PHI .
3. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2009.
4. Sahni Horowitz, "Fundamentals of Data Structures in C", 2nd edition Universities Press, 2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3	2	
CO2	3	2											3	2	
CO3	2	3					2						3	2	
CO4	2	3	3										3	2	
CO5	2	3		2		2				3			3	2	

K.S. Rangasamy College of Technology – Autonomous R2018

50 IT L07 – Programming in C++

IT

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

Objective(s)

- To encompass the basic constructs of object orientedprogramming.
- To create classes and objects for specificapplications.
- To recognize the concept of reusability through inheritance
- To analyze the perception of polymorphism with the help of pointers
- To explore the use of generic programming, Exception Handling and applications of files

Course Outcomes

At the end of the course, the students will be able to

CO1: Identify the essential features of OOP and the elements of C++ programming language

CO2: Implement the concept of classes, objects, constructors and destructors

CO3: Analyze reusability through inheritance and interpret the concept of operator

	overloading CO4: Examine the concept of dynamic memory allocation and runtime polymorphism CO5: Implement the concept of generic programming, exception handling and file operation

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Concepts of OOP - Advantages of OOP,Structure of a C++Program- Formatted Console I/O Operations-Bit Fields - Manipulators - User-defined Manipulators, C++ Declarations, Functions : Return by Reference - Returning more Values by Reference - Default Arguments –Const arguments - Inline Functions - Function Overloading. [9]

Classes and Objects, Constructors and Destructors

Classes in C++ - Declaring Objects- Access Specifiers and their Scope - Defining Member Functions - Static Members - Array of Objects - Constant object and Constant Member Functions - Object as Function Arguments -Friend Function and Friend Classes, Constructors and Destructors: Characteristics - Parameterized Constructors - Overloading Constructors - Copy Constructors - Destructors. [9]

Inheritance, Operator Overloading

Inheritance: Reusability - Types of Inheritance - Object as Class Member, Operator Overloading: The Keyword Operator - Unary, Binary and Stream Operators Overloading- Constraint on Increment and Decrement Operators - Rules for Operator Overloading -Overloading using Friend Function. [9]

Pointers, Memory Models, Binding and Polymorphism

Pointers: Pointer to Class - Pointer to Object –void, wild and this Pointers, Memory Models: Dynamic Memory Allocation - Dynamic Objects, Binding: Binding in C++ - Pointer to Base and Derived class objects -Working with Virtual Functions - Pure Virtual Functions - Abstract Classes - Object Slicing - Working with Strings. [9]

Generic Programming with Templates, Exception Handling and Applications of Files

Class and Function Templates -Overloading of Template Functions, Exception Handling: Principles of Exception Handling -try, catch and throw- Re-throwing Exception, File Stream Classes - Steps of File Operations - File Opening Modes - File Pointers and Manipulators - File Access - Command Line Arguments. [9]

Total Hours 45

Text book(s):

1. Ashok N. Kamthane, “Programming in C++”, Pearson, 2nd Edition, 2013.
2. Herbert Schildt, “The Complete Reference C++”, McGraw-Hill Education, 4th Edition, 2013.

Reference(s) :

1. Stanley Lippman ,Josée , Barbara Moo, " C++ Primer", Addison-Wesley , 5th Edition, 2012
2. BjarneStroustrup, “The C++ programming language”, Addison Wesley, 2013.
3. Venugopal K.R., RajkumarBuyya, “Mastering C++”, 2nd Edition, McGraw-Hill Education, 2013.
4. E. Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill, 5th Edition 2011.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1			1				1	2	3	2
CO2	3	3	3	2	1			1				1	2	3	2
CO3	3	3	3	2	1			1				1	2	3	2
CO4	3	3	3	2	1			1				1	2	3	2
CO5	3	3	3	2	1			1				1	2	3	2

K.S. Rangasamy College of Technology – Autonomous R2018

50 IT E18 / 50 IT L08– Programming in Java

IT

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

Objective(s)

- To understand the concepts of object oriented Programming to develop applications.

	• To develop programs using the packages, interfaces, exceptions and threads. • To develop applications using I/O streams and serialization. • To develop programs using Collection APIs. • To analyze and develop the JDBC technology with real world problems.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Design classes, objects with data Abstraction, Polymorphism and inheritance concepts. CO2: Prompt the package, interface, String handling classes and observe predefined and user Defined Exception handling. CO3: Analyze the importance of lang package and I/O file system. CO4: Compose the functionalities of collections framework classes and interfaces. CO5: Apply the database concepts with JDBC connectivity.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

An overview of Java, Arrays, Methods, Object oriented java programming - Classes and Objects, Inheritance and Polymorphism, Wrapper Class, Abstraction [9]

Java Concepts

Packages and Interfaces, Exception handling, Multithreaded programming, String Handling [9]

I/O Streams

Introduction to Lang package, I/O packages – File, The stream classes, The byte streams, The character streams,Serialization, Externalizable. [9]

Collection Framework

The Collection Interfaces, The Collection Classes and Interfaces, using an Iterator, Working with Maps, The Legacy Classes and Interfaces, String Tokenizer. [9]

Java Database Connectivity

Java Database Programming-Introduction, Relational Database Systems, DML, DDL, DCL and TCL, JDBC, Statement, Prepared Statement. [9]

Total Hours 45

Text book(s):

1.	Herbert Schildt, “Java: The Complete Reference”, Comprehensive coverage of the Java language, Oracle press, Tenth Edition, McGraw-Hill, 2017.
2.	Y.Daniel Liang “Introduction to Java Programming”, Comprehensive Version, Tenth Edition, Pearson Education, 2015 [JDBC only].

Reference(s) :

5.	“Advanced programming in JAVA”, Prentice – Hall of India Private Limited NIIT – 2003.
6.	Pratik Patel and Karlmoss, “Java Data base programming with JDBC”, Second Edition, Dream Tech Press - 2000.
7.	Bert Bates and Kathy Sierra, "Head First Java", SecondEdition, O'Reilly's, 2009.
8.	Online Resources : https://www.tutorialspoint.com, https://www.javatpoint.com, https://www.journaldev.com, https://beginnersbook.com

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

K.S.Rangasamy College of Technology – Autonomous R2018							
50 IT L09 - Database Technology							
IT							
Semester	Hours / Week			Total hrs	Credit	Maximum Marks	
	L	T	P		C	CA	ES	Total
	3	0	0	45	3	40	60	100

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Approved in Academic Council Meeting held on 03/06/2023

BoS Chairman Signature

Objective(s)	• To familiarize the students with various data models and query language. • To learn the fundamentals of data models and to represent a database system using ER diagrams • To impart knowledge on DDL, DML,DCL, and TCL commands • To gain knowledge on data storage and querying concepts. • To expose the fundamentals of transaction processing, recovery concepts.
Course Outcomes	**At the end of the course, the students will be able to** CO1: Model an application's data requirements using conceptual modeling and design database schemas based on the conceptual model. CO2: Apply Relational Query Languages to retrieve the data from database queries. CO3: Compare and contrast various indexing strategies in different database systems to retrieve the data efficiently. CO4: Identify the different types of storage devices to store the data CO5: Implement the properties of a transaction using various locking protocols and ensure database recovery.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Introduction to Database Systems - DBMS Applications - Purpose of DBMS - View of Data - Data Models - ER Model - Database System Architecture - Database Users and Administrators [9]

Relational Algebra and Calculus

Relational Algebra - Unary Operations : Select, Project, Rename - Binary Operations: Union , Set Difference, Cartesian Product - Additional Relational Algebra Operations: Set-Intersection, Natural Join - Aggregate Functions – Relational Calculus [9]

Relational Database and SQL

Basics of SQL, DDL, DML, DQL and TCL Commands – Integrity Constraints: primary key, super key, candidate key, foreign key, unique, not null, check, IN operator - Aggregate functions - Built in functions – Numeric, Date, String functions. [9]

Data Storage and Querying

File Organization - Organization of Records in Files - RAID - Index Structure for Files - Different types of Indexes- B^+-Tree – Query Processing [9]

Transaction Management

Transaction Concepts - ACID Properties – Transaction States – Schedule - Serializability – Concurrency Control - Lock-Based Protocols - Two-Phase Locking Protocol - Recovery System -Failure Classification - Storage - Recovery and Atomicity. [9]

Total Hours 45

Text book(s):

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 7th Edition, McGraw-Hill, 2020.
2. RamezElmasri and Shamkant B. Navathe, "Fundamental Database Systems", 7th Edition, Pearson Education, 2017.

Reference(s):

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 4th Edition, McGraw-Hill, 2020.
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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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

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Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023 **BoS Chairman Signature**

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

Objective(s)	• To develop the basic understanding of the building blocks of AI. • To enhance the knowledge and skills of AI in solving real time problems. • To identify the different technologies, problem settings, and their applications to solve multi-disciplinary problems. • To understand the impact, applications and tools of Industry 4.0. • To analyze the applications of Industry 4.0 to implement artificial intelligent systems
Course Outcomes	**At the end of the course, the students will be able to** CO1: Classify the applications of AI to implement intelligent agents. CO2: Apply the various technologies which are more appropriate for different types of learning tasks in mutliple domains. CO3: Solve real-world problems using Machine Learning, Big Data and IoT. CO4: Apply necessary tools to meet Industry 4.0 standards. CO5: Develop a small AI system in a team environment.

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction

Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality. [9]

Lab Exercise: Write a simple chatbot

Artificial Intelligence

Artificial Intelligence: Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI - Environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI. [9]

Lab Exercise:Study of diverse Artificial Intelligence Tools

Big Data and IoT

Terminologies - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning - Big Data in Databases - Big Data Use cases : Big Data in Social Causes - Big Data for Industry - Big Data Roles and Skills - Big Data Roles - Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications [9]

Lab Exercise: Build and predict dataset using open source tools

Impact, Applications and Tools of Industry 4.0

Impact of Industry 4.0 on Society: Impact on Business, Government, People – Applications: IoT Applications – Manufacturing – Healthcare – Education – Aerospace and Defence – Agriculture – Transportation and Logistics – Tools: Artificial Intelligence, Big Data and Data Analytics, Virtual Reality, Augmented Reality, IoT, Robotics [9]

Lab Exercise:Word Count MapReduce Program Using Eclipse using Hadoop Programming

Applications of AI to Industry 4.0

Smart factories, Predictive Analytics, Predictive maintenance,Computervision,Cyber-physical systems,Industrial robots and Inventory Management [9]

Lab Exercise: Face detection using OpevCV

Total Hours 45

Textbook(s):

1	P. Kaliraj, T. Devi, “Higher Education for Industry 4.0 and Transformation to Education 5.0”.
2	Alasdair Gilchrist. Industry 4.0: The Industrial Internet of Things, Apress Publications, 2016.

Reference(s):

1	SudipMisra, “Introduction to Industry 4.0 and Industrial Internet of Things”, IIT Kharagpur.
2	A Complete Guide to Industry 4.0- Udemy Course-**https://www.udemy.com/course/intro-to-industry-4**
3	Rashmi Agrawal, Marcin Paprzycki, Neha Gupta, “Big Data, IoT, and Machine Learning Tools and Applications”, 1st Edition, CRC Press, 2020.
4	Aydin Azizi,“Applications of Artificial Intelligence Techniques in Industry 4.0”, Kindle Edition, 2018.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2						2	2	2	2	2	3

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CO2	3	3	2	2						2	2	2	3	3	3
CO3	3	3	2	2						2	3	3	3	3	3
CO4	3	3	3	2						2	3	3	2	2	3
CO5	3	3	3	3	3					2	3	3	3	3	3

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50 IT L11– Cyber Security

IT

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

Objective(s)

- To understand the basic structure of information systems.
- To learner will develop an understanding of Web Application Security policies.
- To impart the knowledge of web security testing.
- To learner will gain knowledge about Mobile Platform Security Models.
- To enhance system security and can develop basic security enhancements in stand-alone applications.

Course Outcomes

At the end of the course, the student will be able to

CO1: Classify and develop the Information systems
CO2: Identify the process of protecting websites and online services against different security threats
CO3:Analyze the various testing techniques applied for web security
CO4: Compare the different mobile platform security models
CO5: Evaluate the various testing strategies in mobile security

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hoursindicated.

Introduction

Information system components – Information system categories – Individuals in the information systems – Development of Information systems [9]

Web Application Security

SQL injection, Cross-site request forgery, Cross-site scripting, Attacks and Defenses, Generating and storing session tokens, Authenticating users, The SSL protocol, The lock icon, User interface attacks, Pretty Good Privacy. [9]

Web Security Testing

Introduction and Objectives, Information Gathering, Configuration and Deployment Management Testing, Identity Management Testing, Authentication Testing, Authorization Testing, Input Validation Testing, Testing for weak Cryptography, Client Side Testing [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. Mayank Bhusan, Rajkumar Singh Rathore and Aatif Jamshed, “Fundamental of Cyber Security: Principles, Theory and Practices”,BPB Publishers, Delhi,2017.
2. William Stallings, “Network Security Essentials: Applications and Standards”, Prentice Hall, 4th edition, 2010.

Reference(s):

1. Michael T. Goodrich and Roberto Tamassia, “Introduction to Computer Security”, Addison Wesley, 2011.
2. William Stallings, “Network Security Essentials: Applications and Standards”, Prentice Hall, 4th edition, 2010.
3. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, “Handbook of Applied Cryptography”, CRC Press, 2001.
4. Vijay Kumar Velu, “Mobile Application Penetration Testing”, PACKT Publication, 2016.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3	2	3
CO2	3	3		2									3	2	3
CO3		3	3		2								3	2	
CO4	3	3		2									3	2	3
CO5	3	3		2	2								3	2	3

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50 IT E32 / 50 IT L12 - MERN Stack

IT

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

Objective(s)

- To know the basics operations involved in MongoDB
- To understand the fundamentals of Express JS
- To involving the various component and lifecycle of React JS
- To demonstrate the fundamentals of Node JS
- To explore the various case studies involved in MongoDB, Node JS and React JS

Course Outcomes

At the end of the course, the students will be able to

CO1:Categorize the various operations involved in MongoDB
CO2:Incorporate the updating records, file and connecting strings in Express JS
CO3:Create Advance javascript web pages with the component APL and States in React JS
CO4:Optimize the performance of advanced web page using the REPL in Node JS
CO5: Illustrate the real time applications involved in MongoDB, React JS and Node JS

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

MongoDB Basics [9]

MongoDB-Importing, Exporting, and Querying Data-Creating and Manipulating Documents-Advanced CRUD Operations-Indexing and Aggregation Pipeline

Lab Exercise: Develop a using MongoDB to generate a report from the restaurant database

Express JS [9]

Configuring Routes-Working with Express-Serving Static Files-Working With Middleware-Connecting Stri Configuring-Working With Select Command-Updating Records-Deleting Records

Lab Exercise: Create a hello world application specified by ExpressJs

React JS [9]

History of front end libraries- Motivation for using React- Key differentiators(Virtual DOM, One way bindin Thinking in React-React Component-React Function-Component API-Component lifecycle-State,Pro Mixins-JSX-Reconciliation algorithm

Lab Exercise: Create 3 squares that are vertically and horizontally centered are mentioned by the ReactJs

Node JS [9]

Introduction to Node JS- Node JS Process Model-Advantages of Node JS-Traditional Web Server Model Install Node.JS on Windows-Working on REPL, Node JS Console-Function,Buffer,Module-Core Modules Local Modules-Modules Types-Modules Exports

Lab Exercise: Create an application in node.js which manages employees

Real time Applications [9]

Case Study on Real time (Mongodb)-Case Study on real time applications(React JS)

Lab Exercise: Real time applications in Node JS

Total Hours 45

Text book(s):

1. Shannon Bradshaw, Eoin Brazil, Kristina Chodorow, "MongoDB: The Definitive Guide",3rd Edition,2019
2. Mario Casciaro, Luciano Mammino, "Node.js Design Patterns",3rd Edition, 2020

Reference(s):

1. Kristina Chodorow, "MongoDB: The Definitive Guide: Powerful and Scalable Data Storage" ,2nd Edition, 201
2. KirupaChinnathambi, "Learning React: A Hands-On Guide to Building Web Applications Using React", 2018
3. www.w3schools.com
4. Vasan Subramanian, "Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, Node", 2019

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		2	2							3		
CO2	3	2	1		2		2		3					3	
CO3	3	1	2		2					2		2			3
CO4	3	2	2	2	2			2			1				
CO5	3	2	2		2										

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51 IT E11 / 50 IT L13 – C# and .NET Framework

IT

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

Objective(s)

- 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 skills in writing Windows applications and ADO.NET
- To learn web based applications on .NET

Course Outcomes

At the end of the course, the students will be able to

CO1: Analyze the basic structure of a C# application

CO2: Develop C# programs which makes use of inheritance, polymorphism, interfaces and handle exceptions

CO3: Design windows application and access data with ADO.NET

CO4: Apply the knowledge of data binding to create Web forms and obtain knowledge of Web services

CO5: Discuss about assemblies ,versioning and explore the activities of marshalling and Remoting

Note: The hours given against each topic are of indicative. The faculty has the freedom to decide the hours required for each topic based on importance and depth of coverage required. The marks allotted for questions in the examinations shall not depend on the number of hours indicated.

Introduction to C# [9]

Introducing C# - Overview of C# - Literals, Variables and Data Types - Operators and Expressions - Branching and Looping - Methods - Arrays - Strings - Structures and Enumerations.

Object Oriented Aspects of C# [9]

Classes and Objects - Inheritance and Polymorphism - Interfaces - Operator Overloading - Delegates and Events - Errors and Exceptions.

Window Based Application Development on .NET [9]

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.

Web Based Application Development on .NET [9]

Understanding Web Forms - Creating a Web Forms - Adding Controls - Data Binding - Web Services - SOAP, WSDL and Discovery - Building a Web Service - Creating the Proxy - Session and Cache management.

The CLR and the .NET Framework [9]

Assemblies and Versioning - PE Files, Metadata, Security Boundary, Manifests and Assemblies - Attributes and Reflection - Marshaling and Remoting

Total Hours 45

Text book(s):

1. E. Balagurusamy, “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):

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Passed in BoS Meeting held on 16/05/2023
Approved in Academic Council Meeting held on 03/06/2023

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1.	Herbert Schildt, “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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	3				1	1			2	2	
CO2	1	2	3	3	3				1	1			2	2	
CO3	1	2	2	2	2				1	3	3		2	2	
CO4	1	2	2	2	2				2	3	3		2	2	
CO5	1	2	2	2	2				2	3	3		2	2	