

**R.M.K. ENGINEERING COLLEGE**  
**(An Autonomous Institution)**  
**B.TECH INFORMATION TECHNOLOGY**  
**REGULATIONS – 2020**  
**CHOICE BASED CREDIT SYSTEM**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

1. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics and Information Technology for the applications relevant to various streams of Engineering and Technology.
2. To enrich graduates with the core competencies necessary for applying knowledge of computers and telecommunications equipment to store, retrieve, transmit, manipulate and analyze data in the context of business enterprise.
3. To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.
4. To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.
5. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

**PROGRAM OUTCOMES (POs)**

**ENGINEERING GRADUATES WILL BE ABLE TO:**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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.

7. **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.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **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.
11. **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.
12. **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.

#### **PROGRAM SPECIFIC OBJECTIVES (PSOs)**

1. To create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
2. To manage complex IT projects with consideration of the human, financial, ethical and environmental factors and an understanding of risk management processes, and operational and policy implications.

**MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES**

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	PROGRAMME OUTCOMES (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	2										2
PEO2	3	3	1	1								2
PEO3			3			1						3
PEO4			3		1	2	3	1				
PEO5				3				1	1	2	2	1

**MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES**

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

PROGRAM SPECIFIC OBJECTIVES (PSOs)	PROGRAMME OUTCOMES											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PSO1	3	2			3				2	2		3
PSO2				3			3	3			3	2

Contribution

1: Reasonable

2: Significant

3: Strong

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**I - VIII SEMESTERS CURRICULA AND I - IV SEMESTERS SYLLABI**

**SEMESTER I**

SI. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY COURSES</b>								
1.	20EL101	Communicative English and Life Skills	HS	2	2	0	0	2
2.	20MA101	Engineering Mathematics - I	BS	5	3	2	0	4
3.	20PH101	Physics for Computer Science and Information Technology	BS	3	3	0	0	3
4.	20CH101	Engineering Chemistry	BS	3	3	0	0	3
5.	20GE101	Problem Solving and C Programming	ES	3	3	0	0	3
6.	20EE102	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
<b>LABORATORY COURSES</b>								
7.	20PC111	Physics and Chemistry Laboratory	BS	4	0	0	4	2
8.	20GE111	C Programming Laboratory	ES	4	0	0	4	2
9.	20EL111	Interpersonal Skills -Listening and Speaking Lab	HS	2	0	0	2	1
		Induction Program (Non-Credit Course)	MC	3 Weeks	-	-	-	-
<b>TOTAL</b>				<b>29</b>	<b>17</b>	<b>2</b>	<b>10</b>	<b>23</b>

**SEMESTER II**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY COURSES</b>								
1.	20EL201	Technical English	HS	2	2	0	0	2
2.	20MA201	Engineering Mathematics - II	BS	5	3	2	0	4
3.	20ME103	Computer Aided Engineering Graphics	ES	6	2	0	4	4
4.	20CH102	Environmental Science and Engineering	HS	3	3	0	0	3
5.	20CS201	Data Structures	PC	3	3	0	0	3
<b>LAB INTEGRATED THEORY COURSE</b>								
6.	20CS202	Python Programming	ES	5	3	0	2	4
<b>LABORATORY COURSES</b>								
7.	20EM111	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	20CS211	Data Structures Laboratory	PC	4	0	0	4	2
9.	20EL211	Advanced Reading and Writing Lab	HS	2	0	0	2	1
<b>TOTAL</b>				<b>34</b>	<b>16</b>	<b>2</b>	<b>16</b>	<b>25</b>

**SEMESTER III**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY COURSES</b>								
1.	20MA302	Discrete Mathematics	BS	5	3	2	0	4
2.	20IT301	Object Oriented Programming Principles	PC	3	3	0	0	3
3.	20CS404	Operating Systems	PC	3	3	0	0	3
4.	20CS402	Design and Analysis of Algorithms	PC	4	2	2	0	3
5.	20EC341	Analog and Digital Communication	PC	3	3	0	0	3
<b>LAB INTEGRATED THEORY COURSE</b>								
6.	20CS301	Digital Principles and System Design	ES	5	3	0	2	4
<b>LABORATORY COURSES</b>								
7.	20IT311	Object Oriented Programming Principles Laboratory	PC	4	0	0	4	2
8.	20CS412	Operating Systems Laboratory	PC	4	0	0	4	2
9.	20IT312	Mini Project – I	EEC	2	0	0	2	1
10	20CS313	Aptitude and Coding Skills – I	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>35</b>	<b>17</b>	<b>4</b>	<b>14</b>	<b>26</b>

**SEMESTER IV**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY COURSES</b>								
1.	20MA402	Probability and Statistics	BS	5	3	2	0	4
2.	20IT402	Web Technology - Foundation	PC	3	3	0	0	3
3.	20CS401	Computer Architecture	PC	3	3	0	0	3
4.	20IT403	Database Management Systems	PC	3	3	0	0	3
5.	20GE301	Universal Human Values 2: Understanding Harmony	HS	4	2	2	0	3
<b>LAB INTEGRATED THEORY COURSE</b>								
6.	20IT401	Software Engineering	PC	5	3	0	2	4
<b>LABORATORY COURSES</b>								
7.	20IT411	Web Technology Laboratory	PC	4	0	0	4	2
8.	20IT412	Database Management Systems Laboratory	PC	4	0	0	4	2
9.	20IT413	Internship	EEC	0	0	0	0	1
10.	20CS414	Aptitude and Coding Skills – II	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>33</b>	<b>17</b>	<b>4</b>	<b>12</b>	<b>26</b>

**SEMESTER V**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY COURSES</b>								
1.	20CS501	Computer Networks	PC	3	3	0	0	3
2.	20IT502	Object Oriented Systems Design	PC	3	3	0	0	3
3.	20IT503	Big Data Analytics	PC	3	3	0	0	3
4.		Professional Elective - I	PE	3	3	0	0	3
<b>LAB INTEGRATED THEORY COURSE</b>								
5.	20IT501	Web Development Frameworks	PC	5	3	0	2	4
6.	20EC441	Microprocessors and Interfacing	PC	5	3	0	2	4
<b>LABORATORY COURSES</b>								
7.	20CS511	Networks Laboratory	PC	4	0	0	4	2
8.	20IT511	Object Oriented Systems Design Laboratory	PC	4	0	0	4	2
9.	20IT512	Big Data Analytics Laboratory	PC	4	0	0	4	2
10.	20CS512	Advanced Aptitude and Coding Skills – I	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>36</b>	<b>18</b>	<b>0</b>	<b>18</b>	<b>27</b>

**SEMESTER VI**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY COURSES</b>								
1.	20CS701	Cloud Computing	PC	3	3	0	0	3
2.	20IT601	Mobile Architecture and Development	PC	3	3	0	0	3
3.		Open Elective - I*	OE	3	3	0	0	3
4.		Professional Elective – II	PE	3	3	0	0	3
<b>LAB INTEGRATED THEORY COURSES</b>								
5.	20IT602	Artificial Intelligence and Machine Learning	PC	5	3	0	2	4
6.	20IT603	Cyber Security	PC	5	3	0	2	4
<b>LABORATORY COURSES</b>								
7.	20CS611	Mobile Application Development Laboratory	PC	4	0	0	4	2
8.	20CS711	Cloud Computing Laboratory	PC	4	0	0	4	2
9.	20IT611	Mini Project - II	EEC	2	0	0	2	1
10.	20CS614	Advanced Aptitude and Coding Skills – II	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>34</b>	<b>18</b>	<b>0</b>	<b>16</b>	<b>26</b>

**SEMESTER VII**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY COURSES</b>								
1.		Open Elective - II*	OE	3	3	0	0	3
2.		Professional Elective - III	PE	3	3	0	0	3
3.		Professional Elective - IV	PE	3	3	0	0	3
4.		Professional Elective - V	PE	3	3	0	0	3
<b>LAB INTEGRATED THEORY COURSE</b>								
5.	20IT701	Microservice Architecture	PC	5	3	0	2	4
<b>LABORATORY COURSES</b>								
6.	20IT711	Project Work - Phase I	EEC	4	0	0	4	2
7.	20IT712	Internship	EEC	0	0	0	0	2
<b>TOTAL</b>				<b>21</b>	<b>15</b>	<b>0</b>	<b>6</b>	<b>20</b>



**SEMESTER VIII**

<b>Sl. No</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>LABORATORY COURSES</b>								
1.	20IT811	Project Work - Phase II	EEC	20	0	0	20	10
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>10</b>

\* List of Courses Offered by Other Departments

**TOTAL NO. OF CREDITS: 183**

**HUMANITIES AND SOCIAL SCIENCES (HS)**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20EL101	Communicative English and Life Skills	HS	2	2	0	0	2
2.	20EL111	Interpersonal Skills -Listening and Speaking Lab	HS	2	0	0	2	1
3.	20EL201	Technical English	HS	2	2	0	0	2
4.	20CH102	Environmental Science and Engineering	HS	3	3	0	0	3
5.	20EL211	Advanced Reading and Writing Lab	HS	2	0	0	2	1
6.	20GE301	Universal Human Values 2: Understanding Harmony	HS	4	2	2	0	3

**BASIC SCIENCES (BS)**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20MA101	Engineering Mathematics - I	BS	5	3	2	0	4
2.	20PH101	Physics for Computer Science and Information Technology	BS	3	3	0	0	3
3.	20CH101	Engineering Chemistry	BS	3	3	0	0	3
4.	20PC111	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	20MA201	Engineering Mathematics II	BS	5	3	2	0	4
6.	20MA302	Discrete Mathematics	BS	5	3	2	0	4
7.	20MA402	Probability and Statistics	BS	5	3	2	0	4

**ENGINEERING SCIENCES (ES)**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20GE101	Problem Solving and C Programming	ES	3	3	0	0	3
2.	20EE102	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
3.	20GE111	C Programming Laboratory	ES	4	0	0	4	2
4.	20ME103	Computer Aided Engineering Graphics	ES	6	2	0	4	4
5.	20CS202	Python Programming (Lab Integrated Course)	ES	5	3	0	2	4
6.	20EM111	Engineering Practices Laboratory	ES	4	0	0	4	2
7.	20CS301	Digital Principles and System Design (Lab Integrated Course)	ES	5	3	0	2	4

**PROFESSIONAL CORE (PC)**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20CS201	Data Structures	PC	3	3	0	0	3
2.	20CS211	Data Structures Laboratory	PC	4	0	0	4	2
3.	20CS404	Operating Systems	PC	3	3	0	0	3
4.	20IT301	Object Oriented Programming Principles	PC	3	3	0	0	3
5.	20EC341	Analog and Digital Communication	PC	3	3	0	0	3
6.	20CS402	Design and Analysis of Algorithms	PC	4	2	2	0	3
7.	20CS412	Operating Systems Laboratory	PC	4	0	0	4	2
8.	20IT311	Object Oriented Programming Principles Laboratory	PC	4	0	0	4	2
9.	20IT401	Software Engineering (Lab Integrated Course)	PC	5	3	0	2	4
10.	20IT402	Web Technology - Foundation	PC	3	3	0	0	3
11.	20CS401	Computer Architecture	PC	3	3	0	0	3
12.	20IT403	Database Management Systems	PC	3	3	0	0	3
13.	20IT411	Web Technology Laboratory	PC	4	0	0	4	2
14.	20IT412	Database Management System Laboratory	PC	4	0	0	4	2
15.	20IT501	Web Development Frameworks (Lab Integrated Course)	PC	5	3	0	2	4
16.	20CS501	Computer Networks	PC	3	3	0	0	3
17.	20EC441	Microprocessors and Interfacing (Lab Integrated Course)	PC	5	3	0	2	4
18.	20IT502	Object Oriented Systems Design	PC	3	3	0	0	3
19.	20IT503	Big Data Analytics	PC	3	3	0	0	3
20.	20IT512	Big Data Analytics Laboratory	PC	4	0	0	4	2
21.	20CS511	Networks Laboratory	PC	4	0	0	4	2
22.	20IT511	Object Oriented Systems Design Laboratory	PC	4	0	0	4	2
23.	20IT602	Artificial Intelligence and Machine Learning (Lab Integrated Course)	PC	5	3	0	2	4
24.	20CS701	Cloud Computing	PC	3	3	0	0	3
25.	20IT601	Mobile Architecture and Development	PC	3	3	0	0	3
26.	20IT603	Cyber Security (Lab Integrated Course)	PC	5	3	0	2	4
27.	20CS611	Mobile Application Development Laboratory	PC	4	0	0	4	2
28.	20CS711	Cloud Computing Laboratory	PC	4	0	0	4	2
29.	20IT701	Microservice Architecture (Lab Integrated Course)	PC	5	3	0	2	4

**PROFESSIONAL ELECTIVES(PE)****ELECTIVE - I**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20MA501	Linear Algebra and Calculus	PE	3	3	0	0	3
2.	20IT902	Software Testing	PE	3	3	0	0	3
3.	20IT903	Graph Theory and Applications	PE	3	3	0	0	3
4.	20IT904	Digital Signal Processing	PE	3	3	0	0	3
5.	20IT905	Computer Graphics and Multimedia	PE	3	3	0	0	3
6.	20IT906	Information Storage and Management	PE	3	3	0	0	3
7.	20CS908	Agile Methodologies	PE	3	3	0	0	3
8.	20IT907	Intellectual Property Rights	PE	3	3	0	0	3
9.	20IT901	Design Thinking	PE	4	2	0	2	3
10.	20IT929	Google Cloud: Architecting with Google Compute Engine	PE	4	2	0	2	3
11.	20IT930	Introduction to Application Development	PE	4	2	0	2	3

**ELECTIVE - II**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	20IT909	Advanced Java - JEE	PE	4	2	0	2	3
2.	20IT913	Wireless Adhoc and Sensor Networks	PE	3	3	0	0	3
3.	20IT910	Formal Languages and Automata Theory	PE	3	3	0	0	3
4.	20CS913	Internet of Things	PE	3	3	0	0	3
5.	20CS906	Software Project Management	PE	3	3	0	0	3
6.	20CS922	Service Oriented Architecture	PE	3	3	0	0	3
7.	20CS914	Embedded Systems	PE	3	3	0	0	3
8.	20CS905	Computer Vision	PE	3	3	0	0	3
9.	20AI901	Advanced Databases	PE	3	3	0	0	3

**ELECTIVE - III**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	20IT911	DevOps	PE	3	3	0	0	3
2	20CS907	Human Computer Interaction	PE	3	3	0	0	3
3	20IT912	C# and .Net Programming	PE	3	3	0	0	3
4	20AI701	Deep Learning Techniques	PE	3	3	0	0	3
5	20IT914	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
6	20IT915	Human Rights	PE	3	3	0	0	3
7	20IT916	API and Application Security and Design Patterns	PE	3	3	0	0	3
8	20IT917	Essence of Indian Traditional Knowledge	PE	3	3	0	0	3
9	20IT918	Principles of Compiler Design	PE	3	3	0	0	3

**ELECTIVE - IV**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	20IT921	Blockchain Technologies	PE	3	3	0	0	3
2	20CS910	Social Network Analysis	PE	3	3	0	0	3
3	20AI912	Soft Computing	PE	3	3	0	0	3
4	20CS919	Cyber Forensics	PE	3	3	0	0	3
5	20IT919	Digital Image Processing	PE	3	3	0	0	3
6	20IT920	Network Management	PE	3	3	0	0	3
7	20CE918	Professional Ethics in Engineering	PE	3	3	0	0	3
8	20CS921	Quantum Computing	PE	3	3	0	0	3
9	20CS602	Cryptography and Network Security	PE	3	3	0	0	3
10	20IT908	Liberal Arts	PE	3	3	0	0	3

**ELECTIVE - V**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	20IT922	Information Retrieval Techniques	PE	3	3	0	0	3
2	20IT923	Green Computing	PE	3	3	0	0	3
3	20AI702	Natural Language Processing	PE	3	3	0	0	3
4	20AI904	Speech Processing	PE	3	3	0	0	3
5	20IT924	Web Design and Management	PE	3	3	0	0	3
6	20IT925	Electronic Commerce	PE	3	3	0	0	3
7	20IT926	Fundamentals of Nano Science	PE	3	3	0	0	3
8	20IT927	Indian Constitution	PE	3	3	0	0	3
9	20CS901	Cyber Physical Systems	PE	3	3	0	0	3
10.	20IT928	Introduction to Innovation, IP Management and Entrepreneurship	PE	3	3	0	0	3

**OPEN ELECTIVES**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	20IT001	Database Management Systems	OE	3	3	0	0	3
2	20IT002	Operating Systems	OE	3	3	0	0	3
3	20IT003	Cloud Computing	OE	3	3	0	0	3
4	20IT004	Artificial Intelligence and Machine Learning	OE	3	3	0	0	3
5	20IT005	Big Data Analytics	OE	3	3	0	0	3
6	20IT006	Cyber Security	OE	3	3	0	0	3
7	20IT007	Java Programming	OE	3	3	0	0	3
8	20IT008	C# and .Net	OE	3	3	0	0	3
9	20IT009	Web Design and Development	OE	3	3	0	0	3
10.	20IT010	Introduction to Application Development	OE	4	2	0	2	3

**EMPLOYABILITY ENHANCEMENT COURSES(EEC)**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	20CS313	Aptitude and Coding Skills – I	EEC	2	0	0	2	1
2	20IT312	Mini Project - I	EEC	2	0	0	2	1
3	20IT413	Internship	EEC	0	0	0	0	1
4	20CS414	Aptitude and Coding Skills – II	EEC	2	0	0	2	1
5	20CS512	Advanced Aptitude and Coding Skills – I	EEC	2	0	0	2	1
6	20IT611	Mini Project - II	EEC	2	0	0	2	1
7	20CS614	Advanced Aptitude and Coding Skills – II	EEC	2	0	0	2	1
8	20IT711	Project Work - Phase I	EEC	4	0	0	4	2
9	20IT712	Internship	EEC	0	0	0	0	2
10	20IT811	Project Work - Phase II	EEC	20	0	0	20	10

**MANDATORY COURSE(MC)**

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1		Induction Program (Non-Credit Course)	MC	3 Weeks	-	-	-	-

### Summary

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	PERCENTAGE
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	3	6	-	3	-	-	-	-	12	6.56
2.	BS	12	4	4	4	-	-	-	-	24	13.11
3.	ES	8	10	4	-	-	-	-	-	22	12.02
4.	PC	-	5	16	17	23	18	4	-	83	45.36
5.	PE	-	-	-	-	3	3	9	-	15	8.19
6.	OE	-	-	-	-	-	3	3	-	6	3.28
7.	EEC	-	-	2	2	1	2	4	10	21	11.48
8.	MC	-	-	-	-	-	-	-	-	-	-
	<b>Total</b>	<b>23</b>	<b>25</b>	<b>26</b>	<b>26</b>	<b>27</b>	<b>26</b>	<b>20</b>	<b>10</b>	<b>183</b>	<b>100</b>

Recommended By Board of Studies
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No.: 2
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Date: 06.08.2021
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**SEMESTER I**

<b>20EL101</b>	<b>COMMUNICATIVE ENGLISH AND LIFE SKILLS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>

**OBJECTIVES:** The Course will enable learners to:

- Strengthen their basic reading and writing skills.
- Comprehend listening contexts competently.
- Improve their speaking skills to speak fluently in real contexts.
- Develop vocabulary of a general kind and enhance their grammatical accuracy.

**UNIT I COMMUNICATION BASICS 6**

Listening - short texts- short formal and informal conversations. Speaking- introducing oneself - exchanging personal information. Reading- practice in skimming-scanning and predicting. Writing-completing sentences- developing hints-free writing – Everyday expressions- collocations. Life Skills- Overview of Life Skills: significance of life skills.

**UNIT II COMMUNICATION INTERMEDIATE 6**

**Listening** - telephonic conversations. **Speaking** – sharing information of a personal kind—greeting – taking leave. **Reading**—short comprehension passages -pre-reading-post reading-comprehension questions (multiple choice questions and /or short questions/ open-ended questions) - **Writing** –paragraph writing- topic sentence- main ideas, short narrative descriptions using some suggested vocabulary and structures. **Life skills**– Self-awareness: definition, need for self-awareness; Coping with Stress and Emotions.

**UNIT III COMMUNICATION VANTAGE 6**

**Listening** – listening to longer texts and filling up the table - **Speaking**- asking about routine actions and expressing opinions. **Reading**- Long texts (cloze reading) - **Writing**- jumbled sentences - product description - use of reference words and discourse markers. Grammar – Tenses - phrasal verbs - Wh– Questions, yes or no questions and direct / indirect questions– countable & uncountable nouns – modal verbs. **Life skills** – Assertiveness vs Aggressiveness

**UNIT IV SYNERGISTIC COMMUNICATION 6**

**Listening-** listening to dialogues or conversations and completing exercises based on them -  
**Speaking-** speaking about oneself- speaking about one's friend –**Reading-** different types of texts- magazines -**Writing-** letter writing, informal or personal letters-e-mails-conventions of personal email - Language development - synonyms – antonyms. **Life Skills** – Problem Solving Techniques.

**UNIT V COMMUNICATION HIGHER 6**

**Listening** – listening to TED talks - **Speaking** – role play – **Reading-** Biographies –**Writing-** writing short essays (analytical & issue-based essays) – dialogue writing. **Life Skills**– Leadership & Decision making.

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**At the end of the course, learners will be able to:**

- Read articles of a general kind in magazines and newspapers efficiently and identify different life skills.
- Participate efficiently in informal conversations and develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
- Comprehend conversations and short talks delivered in English.
- Write short essays of a general kind and personal letters and emails in English.
- Develop vocabulary of a general kind by enriching their reading skills.
- Use appropriate thinking and problem- solving techniques to solve new problems.

**TEXT BOOKS:**

1. Kumar, Suresh E and Sreehari,P. Communicative English. Orient Black Swan, 2007.
2. Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.

**REFERENCES:**

1. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.

- Dhanavel, S P. English and Soft Skills, Volume Two, Orient Black Swan, ISBN 978 93 528769142.
- Elbow, Peter. Writing Without Teachers. London: Oxford University Press, 1973. Print.
- Larry James, The First Book of Life Skills; First Edition, Embassy Books, 2016.
- Larsen, Kristine, Stephen Hawking: A Biography, Greenwood: Publishing Group, 2005.
- Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student 's Book & Workbook) Cambridge University Press, New Delhi: 2005.

<b>20MA101</b>	<b>ENGINEERING MATHEMATICS – I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**OBJECTIVES:**

The syllabus is designed to:

- Explain the concepts of matrix algebra.
- Make the students understand the idea of curvature, evolutes and envelopes.
- Impart the knowledge of functions of several variables.
- Introduce the concepts of Gamma and Beta integral.
- Develop an understanding on the basics of multiple integrals.

**UNIT I MATRICES 9+6**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Statement and applications of Cayley-Hamilton Theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

**UNIT II APPLICATIONS OF DIFFERENTIAL CALCULUS 9+6**

Curvature in Cartesian and Polar Co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes (excluding Evolute as envelope of normals).

**UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+6**

Limits – Continuity – Partial derivatives (excluding Euler's theorem) – Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor's series for functions

of two variables – Maxima and minima of functions of two variables – Lagrange’s method of undetermined multipliers.

**UNIT IV                    GAMMA, BETA INTEGRALS AND APPLICATIONS                    9+6**

Gamma and Beta Integrals – Properties – Relation between Gamma and Beta functions, Evaluation of integrals using Gamma and Beta functions.

**UNIT V                    MULTIPLE INTEGRALS                    9+6**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids.

**TOTAL: 75 PERIODS**

**OUTCOMES:**

**After the successful completion of the course, the student will be able to:**

- Diagonalize a matrix by orthogonal transformation.
- Determine the Evolute and Envelope of curves.
- Examine the maxima and minima of function of several variables.
- Apply Gamma and Beta integrals to evaluate improper integrals.
- Evaluate the area and volume by using multiple integrals.

**TEXT BOOKS:**

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10<sup>th</sup> Edition, New Delhi, 2016.
2. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
3. T. Veerarajan, "Engineering Mathematics", Tata McGraw Hill, 2<sup>nd</sup> Edition, New Delhi, 2011.

**REFERENCES:**

1. M. K. Venkataraman, "Engineering Mathematics, Volume I", 4<sup>th</sup> Edition, The National Publication Company, Chennai, 2003.
2. Sivaramakrishna Dass, C. Vijayakumari, "Engineering Mathematics", Pearson Education India, 4<sup>th</sup> Edition 2019.

3. H. K. Dass, and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Private Limited, 3<sup>rd</sup> Edition 2014.
4. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, 6<sup>th</sup> Edition, New Delhi, 2008.
5. S.S. Sastry, "Engineering Mathematics", Vol. I & II, PHI Learning Private Limited, 4<sup>th</sup> Edition, New Delhi, 2014.

<b>20PH101</b>	<b>PHYSICS FOR COMPUTER SCIENCE AND INFORMATION TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to B.E.(CSE) and B.Tech (ADS and IT))</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To learn the fundamental concepts of physics and apply this knowledge to scientific, engineering and technological problems.
- To make the students enrich basic knowledge in electronics and quantum concepts and apply the same in computing fields.

**UNIT I LASER AND FIBRE OPTICS 9**

Population of energy levels – Einstein's A and B coefficients derivation -Resonant cavity - Optical amplification (qualitative) - Semiconductor lasers: homojunction and heterojunction- Engineering applications of lasers in data storage (qualitative).

Fibre optics: Principle, numerical aperture and acceptance angle -V-number - Types of optical fibres (Material, refractive index and mode) -Losses in optical fibre - Fibre optic communication- Fibre optic sensors (pressure and displacement).

**UNIT II MAGNETIC PROPERTIES OF MATERIALS 9**

Magnetic dipole moment - atomic magnetic moments - Origin of magnetic moments- Magnetic permeability and susceptibility - Magnetic material classifications- Diamagnetism - Paramagnetism- Ferromagnetism -Antiferromagnetism- Ferrimagnetism - Ferromagnetism: Domain Theory- M versus H behaviour- Hard and soft magnetic materials - Examples and uses - Magnetic principle in computer data storage - Magnetic hard disc (GMR sensor)- Introduction to Spintronics.

### **UNIT III                      ELECTRICAL PROPERTIES OF MATERIALS                      9**

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity expression - Wiedemann-Franz law - Success and failures of CFT- Particle in a three dimensional box - Degenerate states - Effect of temperature on Fermi function- Density of energy states and average energy of electron at 0 K - Energy bands in solids.

### **UNIT IV                              SEMICONDUCTOR PHYSICS                              9**

Intrinsic Semiconductors – Energy band diagram -Direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors- Band gap determination- Extrinsic semiconductors - n-type and p-type semiconductors (qualitative) -Variation of Fermi level with temperature and impurity concentration - Hall effect and its applications.

### **UNIT V INTRODUCTION TO NANO DEVICES AND QUANTUM COMPUTING                      9**

Introduction to nanomaterial -Electron density in bulk material - Size dependence of Fermi energy - Quantum confinement - Quantum structures - Density of states in quantum well, quantum wire and quantum dot structure - Band gap of nanomaterial- Tunneling: single electron phenomena and single electron transistor - Quantum dot laser. Quantum computing: Introduction - Differences between quantum and classical computation.

**TOTAL: 45 PERIODS**

#### **OUTCOMES:**

**On completion of this course, the students will gain knowledge and will be able to**

- Know the principle, construction and working of lasers and their applications in fibre optic communication.
- Understand the magnetic properties of materials and their specific applications in computer data storage.
- Analyze the classical and quantum electron theories and energy band structures.
- Evaluate the conducting properties of semiconductors and its applications in various devices.
- Comprehend the knowledge on quantum confinement effects.
- Apply optical, magnetic and conducting properties of materials, quantum concepts at the nanoscale in various applications.

#### **TEXT BOOKS:**

1. M.N. Avadhanulu and P.G. Kshirsagar, "A text book of Engineering Physics", S. Chand and Company, New Delhi, 2014.
2. R.K. Gaur and S.L. Gupta, "Engineering Physics", Dhanpat Rai Publications (P) Ltd., Eighth Edition., New Delhi, 2001.
3. A. Marikani, "Materials Science", PHI Learning Private Limited, Eastern Economy Edition, 2017.
4. V. Rajendran, "Materials Science", Tata McGraw-Hill, 2011.
5. R.A.Serway and J.W. Jewett, "Physics for Scientists and Engineers", Ninth Edition., Cengage Learning, 2014.
6. C.Kittel, "Introduction to Solid State Physics", 8<sup>th</sup>Edition., John Wiley & Sons, NJ, USA, 2005.
7. G.W.Hanson, "Fundamentals of Nanoelectronics", Pearson Education, 2008.

#### **REFERENCES:**

1. D. Halliday, R. Resnick and J. Walker, "Fundamentals of Physics", 9<sup>th</sup> Edition, John Wiley & sons, 2011.

2. R.P. Feynman, "The Feynman Lectures on Physics - Vol. I, II and III", The New Millennium Edition, 2012.
3. N.W. Aschroft and N.D.Mermin, "Solid State Physics", Harcourt College Publishers, 1976.
4. S.O. Pillai, "Solid state physics", New Age International, 2015.
5. M.A.Wahab, "Solid State Physics", 3<sup>rd</sup> Edition, Narosa Publishing House Pvt. Ltd., 2015
6. N.Garciaand A.Damask, "Physics for Computer Science Students", Springer-Verlag,2012.
7. B.Rogers, J. Adams and S.Pennathur,"Nanotechnology: Understanding Small System", CRC Press, 2014.
8. C.P. Williams, "Explorations in Quantum Computing", Springer-Verlag London, 2011.

<b>20CH101</b>	<b>ENGINEERING CHEMISTRY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to CSE, EEE, ECE, EIE, IT, ADS)</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

The goal of this course is to achieve conceptual understanding of the applications of chemistry in engineering and technology. The syllabus is designed to:

- Understand the role of chemistry in everyday life.
- Develop an understanding of the basic concepts of electro chemistry and its applications.
- Learn the principles and generation of energy in different types of batteries, fuel cells, nuclear reactors, solar cells and windmills.
- Make them acquire basic knowledge of polymers, their classification and the applications of speciality polymers in engineering and technology.
- Understand the preparation, properties and applications of nanomaterials in various fields.



## UNIT I CHEMISTRY IN EVERYDAY LIFE 8

**Importance of chemistry in everyday life**- food additives - types (colours, preservatives, flavours and sweeteners), effects - food adulteration – types of adulteration (intentional, incidental) - effects of food adulterants – cosmetics and personal care products (fairness creams, perfumes, deodorants, shampoos)- effects – beverages-classification – carbonated beverages – nutritive values and effects.

**Water** – impurities – industrial uses of water – hardness, external treatment (demineralization) – desalination (reverse osmosis).

## UNIT II ELECTROCHEMISTRY 10

**Introduction** – terminology - conductance of electrolytes- specific conductance, equivalent conductance, molar conductance- factors affecting conductance- origin of electrode potential- single electrode potential, standard electrode potential- measurement of single electrode potential-reference electrodes (standard hydrogen electrode, calomel electrode) - electrochemical series, applications – measurement of EMF of the cell – Nernst equation (derivation), numerical problems.

**Chemical sensors** – principle of chemical sensors- breath analyzer and Clark oxygen analyzer.

## UNIT III ENERGY STORAGE DEVICES AND ENERGY SOURCES 9

**Batteries** – primary battery (alkaline battery) - secondary battery (Pb-acid battery, Ni-metal hydride battery, Li-ion battery) - fuel cells (H<sub>2</sub>-O<sub>2</sub> fuel cell).

**Nuclear Energy** –nuclear reactions – fission, fusion, differences, characteristics– nuclear chain reactions –light water nuclear reactor – breeder reactor.

**Renewable energy sources**- solar energy – thermal conversion (solar water heater and heat collector) - photovoltaic cell– wind energy.

## UNIT IV POLYMERS 9

**Introduction** – monomer, functionality, degree of polymerization – classification based on sources and applications – effect of polymer structure on properties - types of polymerization (addition, condensation) - thermoplastic and thermosetting resins –

preparation, properties and applications of Teflon, polyvinyl chloride, polycarbonate, Bakelite.

**Special polymers** - biodegradable polymers - properties and applications of polycaprolactone, polyhydroxyalkanoate – properties and applications of electrically conducting polymers (poly aniline, polyvinylidene fluoride).

## UNIT V

## NANOCHEMISTRY

9

**Introduction** – synthesis – top-down process (laser ablation, chemical vapour deposition), bottom-up process (precipitation, electrochemical deposition) – properties of nanomaterials – types (nanorods, nanowires, nanotubes-carbon nanotubes, nanocomposites).

**Applications** of carbon nanotubes – applications of nanomaterials in electronics, information technology, medical and healthcare, energy, environmental remediation, construction and transportation industries.

**TOTAL: 45 PERIODS**

### OUTCOMES:

**Upon completion of the course, the students will be able to:**

- Illustrate the role of chemistry in everyday life and the industrial uses of water.
- Construct electrochemical cells and to determine the cell potential.
- Compare and analyse the different energy storage devices and to explain potential energy sources.
- Classify different types of polymeric materials and to discuss their properties and applications.
- Explain basic concepts of Nano chemistry and to enumerate the applications of nanomaterials in engineering and technology.

### TEXT BOOKS:

1. P. C. Jain and Monika Jain, “Engineering Chemistry”, 17<sup>th</sup> edition, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2018.
2. Prasanta Rath, “Engineering Chemistry”, 1<sup>st</sup> edition, Cengage Learning India Pvt. Ltd., Delhi, 2015.

**REFERENCES:**

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", 12<sup>th</sup> edition, S. Chand & Company, New Delhi, 2010.
2. Kirpal Singh, "Chemistry in daily life", 3<sup>rd</sup> edition, PHI Learning Pvt. Ltd., 2012.
3. J. C. Kuriacose and J. Rajaram, "Chemistry in Engineering and Technology", Volume-1 & Volume -2, Tata McGraw-Hill Education Pvt. Ltd., 2010.
4. Geoffrey A. Ozin, Andre C. Arsenault, Ludovico Cademartiri, "Nanochemistry: A Chemical Approach to Nanomaterials", 2<sup>nd</sup> edition, RSC publishers, 2015.
5. Prasanna Chandrasekhar, "Conducting polymers, fundamentals and applications - A Practical Approach", 1<sup>st</sup> edition, Springer Science & Business Media, New York, 1999.

<b>20GE101</b>	<b>PROBLEM SOLVING AND C PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To make the students understand the fundamentals of problem solving using Algorithm and Flowchart
- To teach the basic programming constructs for solving simple problems
- To introduce the basic concepts of arrays and strings
- To acquaint the students about functions, pointers, structures and their relationship
- To impart knowledge on the concepts of file handling

**UNIT I INTRODUCTION TO ALGORITHM AND C 9**

Introduction to Computer System – Block diagram, Program Development Life Cycle

**General problem Solving concepts:** Algorithm and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops.

**Imperative languages:** Introduction to imperative language, syntax and constructs of a specific language (ANSI C), Applications

**Types, Operators:** Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Basic I/O using scanf, printf, Operators – Types, Precedence, Associativity, Proper variable naming and Hungarian Notation.

**UNIT II CONTROL FLOW STATEMENTS 7**

Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops – while, do, for, break and continue, goto labels, structured and unstructured programming.

**UNIT III ARRAYS AND FUNCTIONS 10**

Arrays and Strings – Initialization, Declaration – One Dimensional and Two Dimensional arrays – Linear search, Binary Search, Matrix Operations (Addition and Subtraction)  
Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialisation, Recursion, Pre-processor, Standard Library Functions and return types.

**UNIT IV STRUCTURES AND POINTERS 10**

Basic Structures, Structures and Functions, Array of structures.

Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Initialisation of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated.

Pointer of structures, Self-referential structures, Table look up, typedef, unions, Bit-fields

**UNIT V FORMATTED I/O AND FILE PROCESSING 9**

Formatted Output – fprintf, Formated Input – fscanf, Variable length argument list

Files - file access including FILE structure, fopen, fread, fwrite, stdin, stdout and stderr, File Types – Text, Binary - Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon completion of the course, the students will be able to**

- Develop algorithmic solutions to simple computational problems
- Develop simple applications using basic constructs
- Write programs using arrays and strings
- Design and implement applications using functions, pointers and structures.
- Design applications using sequential and random access file processing.

**TEXT BOOKS:**

1. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Pearson Education India, 2nd Edition, 2015.
2. Anita Goel and Ajay Mittal, “ Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

**REFERENCES:**

1. B. Gottfried, Programming with C, Schaum Outline Series, Fourth Edition, 2018
2. Herbert Schildt, C: The Complete Reference, McGraw Hill, Fourth Edition, 2017
3. Yashavant Kanetkar, Let Us C, BPB Publications, 16<sup>th</sup> Edition, 2018.
4. Reema Thareja, “Programming in C”, 2<sup>nd</sup> Edition, Oxford University Press, 2018.
5. Zed A. Shaw, “Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (like C)”, (Zed Shaw’s Hard Way Series), 1<sup>st</sup> Edition, Addison- Wesley Professional, 2015.

<b>20EE102</b>	<b>BASIC ELECTRICAL, ELECTRONICS AND MEASUREMENT ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To impart knowledge on fundamentals of electrical circuits and its analysis
- To interpret the basic principles of electrical machines and their performance
- To examine the different energy sources and protection methods

- To explore the different types of electronic circuits and its characteristics
- To acquire knowledge on the principles and operation of measuring instruments and transducers

**UNIT I                      ELECTRICAL CIRCUITS ANALYSIS                      9**

Ohms Law, Kirchhoff's Law-power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- -star delta conversion.

**UNIT II                      POWER SYSTEM                      9**

Power Generation -Thermal-Hydro-wind and solar. construction and working principle. Protection-need for earthing, fuses and circuit breakers. Energy Tariff calculation for domestic loads.

**UNIT III                      ELECTRICAL MACHINES                      9**

DC Generator-Types, Construction, working principle, EMF equation, DC Motor- working Principle,- Three Phase Induction Motors- Types, Construction, working principle- Single Phase Induction Motors,-working Principle-Transformers-Types and construction, EMF equation-Basics of Stepper Motor- applications of various machines

**UNIT IV                      ELECTRONIC CIRCUITS                      9**

PN Junction-VI Characteristics of Diode, Rectifier- zener diode, Transistors OPAMP-configuration, differentiator, integrator, ADC- Types, Successive approximation type, DAC-Types, Weighted resistor DAC and R-2R ladder type, Voltage regulator IC using LM 723,LM 317.

**UNIT V                      ELECTRICAL MEASUREMENT                      9**

Characteristic of measurement-errors in measurement, torque in indicating instruments-moving coil and moving iron meters, Induction type Energy meter and Dynamometer watt meter. Transducers- classification-Thermocouple, RTD, Strain gauge, LVDT, LDR and piezoelectric. Oscilloscope-CRO.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**Upon completion of the course, the students will be able to:**

- Analyse the electric circuits.
- Classify the different types of electric machines and transformers
- Study the different type of renewable sources and common domestic loads.
- Acquire knowledge in basics of electronic circuits.
- Describe the different types of measuring instruments and transducers

**TEXT BOOKS:**

1. S.K.Bhattacharya, Basic Electrical and Electronics Engineering, Pearson  
**(Covers Units 1,2,4 and 5)**
2. C L Wadhwa, Generation Distribution and Utilization of Electrical Energy, New Age International: **Unit 3 except Domestic refrigerator and air conditioner - construction and working principle)**

**REFERENCES:**

1. S.B. Lal Seksen and Kaustuv Dasgupta, Fundaments of Electrical Engineering, Cambridge, 2016
2. B.L Theraja, Fundamentals of Electrical Engineering and Electronics. Chand & Co
3. S.K.Sahdev, Basic of Electrical Engineering, Pearson
4. John Bird, —Electrical and Electronic Principles and Technologyll, Fourth Edition, Elsevier,
5. Mittle, Mittal, Basic Electrical Engineeringll, 2nd Edition, Tata McGraw-Hill Edition, 2016.
6. R.S Khurmi and J K Gupta, Textbook of Refrigeration and Air-conditioning (M.E.), S Chand& Co

**20PC111****PHYSICS AND CHEMISTRY LABORATORY****L T P C****(Common to all Branches except CSBS)****0 0 4 2****OBJECTIVES:**

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter, semiconductors and liquids.

### **LIST OF EXPERIMENTS: PHYSICS LABORATORY**

(Any five experiments to be conducted)

1. Determination of wavelength and velocity of ultrasonic waves by Ultrasonic Interferometer.
2. Determination of thermal conductivity of a poor conductor by LEE'S Disc method.
3. (i) Determination of wavelength and divergence angle of semiconductor laser source using diffraction grating.  
(ii) Determination of particle size by using diffraction of semiconductor laser beam.  
(iii) Analysis of Numerical aperture and acceptance angle of an optical fibre.
4. Determination of Young's Modulus of a beam by non-uniform bending method.
5. Determination of the moment of inertia of the disc and rigidity modulus of wire by Torsional pendulum.
6. Spectrometer - Determination of wavelength of Mercury Spectrum using diffraction grating.
7. Determination of thickness of wire by air wedge method.
8. Determination of Young's Modulus of a beam by Uniform bending method.
9. Determination of band gap of a semiconductor.

**TOTAL: 30 PERIODS**

#### **OUTCOMES:**

**Upon completion of the course, based on hands-on experience of the students, they will be able to**

- Use the ultrasonic interferometer and to determine the wavelength and velocity of ultrasonic waves of a liquid.
- Examine the thermal conductivity of a bad conductor.



- Determine the wavelength of mercury spectrum and also determine the wavelength of a laser source, particle size, divergence angle of semiconductor laser source using diffraction grating and to analyze the numerical aperture and acceptance angle of an optical fibre.
- Examine the Young's modulus of a beam by uniform and non-uniform bending and to estimate the moment of inertia of the disc and rigidity modulus of wire by torsional pendulum.
- Calculate the thickness of a thin wire by the interference pattern.
- Determine the band gap of a semiconductor.

#### **REFERENCES:**

1. Physics laboratory manual, Department of Physics, R.M.K. Engineering College, 2019.
2. Wilson J.D. and Hernandez C.A., - Physics Laboratory Experiments, Houghton Mifflin Company, New York, 2005.

#### **LIST OF EXPERIMENTS: CHEMISTRY LABORATORY**

##### **OBJECTIVES:**

To make the students acquire practical skills through volumetric and instrumental analysis

1. Determination of total, temporary and permanent hardness of water by EDTA method.
2. Conductometric titration of strong acid vs. strong base.
3. Determination of strength of acids in a mixture using a conductivity meter.
4. Determination of strength of given hydrochloric acid using a pH meter.
5. Estimation of the iron content of the given solution using a potentiometer.
6. Estimation of the iron content of the water sample using a spectrophotometer (thiocyanate method).
7. Estimation of sodium present in water using a flame photometer.
8. Determination of the molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Determination of corrosion rate by weight loss method.
10. Determination of flash and fire point of a lubricating oil (Pensky Martens apparatus).
11. Determination of concentration of a given solution by constructing a galvanic cell.

**TOTAL: 30 PERIODS****OUTCOMES:****Based on hands-on experience, students will be able to:**

- Analyse the given hard water sample and estimate different types of hardness present
- Observe and analyse the change in conductivity of an acid(s) when added with base through conductometry.
- Examine the change in pH when an acid is added with a base using pH meter.
- Understand the redox reactions and its impact on emf values through potentiometry.
- Determine the flash and fire point of an oil
- Assess the corrosion rate of a given metal
- Construct an electrochemical cell to determine the concentration of the given solution.

**REFERENCES:**

1. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, "Vogel's Quantitative Chemical Analysis", 6th edition, Pearson Education Pvt. Ltd., 2009.

**20GE111****C PROGRAMMING LABORATORY**

L	T	P	C
0	0	4	2

**OBJECTIVES:**

- To make the students write simple programs using basic constructs
- To familiarize the concepts of strings, pointers, functions and structures
- To equip the students on the knowledge of file processing concepts

**LIST OF EXPERIMENTS:**

1. Constructing Flow charts using RAPTOR tools.
2. Programs using I/O statements and expression
3. Write a program to find whether the given line is horizontal or vertical.
4. Write a program to calculate the distance between two points  $p1(x1,y1)$ ,  $p2(x2,y2)$ .
5. Write a program to calculate the force for the given mass and acceleration.

6. Write a program to calculate the Young's modulus.
7. Write a program to calculate the type of solution based on its pH value.
8. Write a program to temperature conversion (Fahrenheit to Celsius and vice versa)
9. Programs using decision-making constructs.
10. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
11. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
12. Check whether a given number is Armstrong number or not?
13. Given a set of numbers like, find sum of weights based on the following conditions.
  - 5 if it is a perfect cube.
  - 4 if it is a multiple of 4 and divisible by 6.
  - 3 if it is a prime number.

Sort the numbers based on the weight in the increasing order as shown below

<10,its weight>, <36,its weight>, <89,its weight>

14. Populate an array with height of persons and find how many persons are above the average height.
15. Populate a two dimensional array with height and weight of persons and compute the Body Mass Index of the individuals.
16. Given a string —a\$bcd./fgll find its reverse without changing the position of special characters.(Example input:a@gh%;j and output:j@hg%;a)
17. Convert the given decimal number into binary, octal and hexadecimal numbers using user-defined functions.
18. From a given paragraph perform the following using built-in functions:
  - a. Find the total number of words.
  - b. Capitalize the first word of each sentence.
  - c. Replace a given word with another word.
19. Solve towers of Hanoi using recursion.
20. Sort the list of numbers using pass by reference.
21. Generate salary slip of employees using structures and pointers. Create a structure

Employee with the following members:

EID, Ename, Designation, DOB, DOJ, Basicpay

Note that DOB and DOJ should be implemented using structure within structure.

22. Compute internal marks of students for five different subjects using structures and functions.

23. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

24. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

25. Mini project: Create a —Railway reservation system with the following modules

- Booking
- Availability checking
- Cancellation
- Prepare chart

**TOTAL: 60 PERIODS**

### **OUTCOMES:**

**Upon completion of the course, the students will be able to:**

- Write programs for simple applications making use of basic constructs, arrays and strings.
- Develop programs involving functions, recursion, pointers, and structures.
- Create applications using sequential and random access file processing.

### **TEXT BOOKS:**

1. Brian W Kernighan and Dennis M Ritchie, The C Programming Language, Pearson Education India, 2nd Edition, 2015.
2. Anita Goel and Ajay Mittal, “ Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

### **REFERENCES:**

1. B. Gottfried, Programming with C, Schaum Outline Series, Fourth Edition, 2018

2. Herbert Schildt, C: The Complete Reference, McGraw Hill, Fourth Edition, 2017
3. Yashavant Kanetkar, Let Us C, BPB Publications, 16<sup>th</sup> Edition, 2018.
4. Reema Thareja, "Programming in C", 2<sup>nd</sup> Edition, Oxford University Press, 2018.
5. Zed A. Shaw, "Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (like C)", (Zed Shaw's Hard Way Series), 1<sup>st</sup> Edition, Addison- Wesley Professional, 2015.

<b>20EL111</b>	<b>INTERPERSONAL SKILLS - LISTENING &amp; SPEAKING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

### **OBJECTIVES:**

The Course will enable learners to:

- Equip and strengthen the English language skills.
- Provide guidance and practice to engage in specific academic speaking activities and enhance writing skills with specific reference to technical writing (interview skills).
- Improve general and academic listening skills.
- Demonstrate their presentation skills competently.

### **UNIT I**

**6**

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics - taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

### **UNIT II**

**6**

Listen to a process information- give information, as part of a simple explanation – conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

**UNIT III**

**6**

Deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail.

**UNIT IV**

**6**

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and participating in conversations.

**UNIT V**

**6**

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**At the end of the course Learners will be able to:**

- Listen and respond appropriately.
- Participate in group discussions.
- Make effective presentations.
- Participate confidently and appropriately in conversations both formal and informal.

**TEXT BOOKS:**

1. Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.
2. Dhanavel, S P. English and Soft Skills, Volume Two, Orient Black Swan, ISBN 978 93 528769142.

**REFERENCES:**

1. Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014.
4. Richards, C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010
5. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.

## SEMESTER II

**20EL201**

**TECHNICAL ENGLISH**

L	T	P	C
2	0	0	2

### OBJECTIVES:

The Course prepares second semester Engineering and Technology students to:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.

- Foster their ability to write convincing job applications and effective reports.
- Demonstrate their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.

## **UNIT I INTRODUCTION - TECHNICAL ENGLISH 6**

**Listening-** Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- **Speaking** –Asking for and giving directions- **Reading** – reading short technical texts from journals- newspapers- **Writing-** purpose statements – extended definitions – writing instructions – checklists – recommendations-Vocabulary Development- technical vocabulary. Language Development –subject verb agreement - compound words.

## **UNIT II READING AND STUDY SKILLS 6**

**Listening-** Listening to longer technical talks and completing exercises based on them- **Speaking** -describing a process-**Reading**– reading longer technical texts- identifying the various transitions in a text- paragraphing- **Writing-** interpreting charts, graphs- Vocabulary Development-vocabulary used in formal letters/emails and reports Language Development- impersonal passive voice, numerical adjectives.

## **UNIT III TECHNICAL WRITING AND GRAMMAR 6**

**Listening-** Listening to classroom lectures/ talks on engineering/technology -**Speaking** – introduction to technical presentations- **Reading** – longer texts both general and technical, practice in speed reading; **Writing-**Describing a process, use of sequence words- Vocabulary Development- sequence words- Misspelled words. Language Development- embedded sentences

## **UNIT IV REPORT WRITING 6**

**Listening-** Listening to documentaries and making notes. **Speaking** – mechanics of presentations-**Reading** – reading for detailed comprehension- **Writing-** Report Writing



(accident and survey) - minutes of a meeting - Vocabulary Development- finding suitable synonyms-paraphrasing-. Language Development-reported speech.

**UNIT V                      GROUP DISCUSSION AND JOB APPLICATIONS                      6**

**Listening-** TED talks; **Speaking** –participating in a group discussion **-Reading**– reading and understanding technical articles **Writing**– email etiquette- job application – cover letter – Résumé preparation (via email and hard copy)- Vocabulary Development- verbal analogies - Language Development- clauses- if conditionals.

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**At the end of the course learners will be able to:**

- Read technical texts and write area- specific texts effortlessly.
- Listen and comprehend lectures and talks in their area of specialization successfully.
- Speak appropriately and effectively in varied formal and informal contexts.
- Write reports and winning job applications.

**TEXT BOOKS:**

1. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
2. Sudharshana.N.P and Saveetha C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

**REFERENCES:**

- 1.Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007.
2. Herbert, A. J. The Structure of Technical English.Longman.1976.
3. Kumar, Suresh. E. Engineering English. Orient Black swan: Hyderabad,2015.
4. Means, L. Thomas and Elaine Langlois, English & Communication for Colleges. Cengage Learning, USA: 2007.
5. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.

**20MA201****ENGINEERING MATHEMATICS – II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**OBJECTIVES:**

The syllabus is designed to:

- Explain various techniques in solving ordinary differential equations.
- Make the students understand the concepts of vector differentiation and integration.
- Introduce the concepts of Laplace transforms and its applications.
- Develop an understanding on analytic function, conformal mapping and complex integration.

**UNIT I      ORDINARY DIFFERENTIAL EQUATIONS****9+6**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

**UNIT II      VECTOR CALCULUS****9+6**

Gradient, divergence and curl (excluding vector identities) – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (Statement only) – Simple applications involving cubes and rectangular parallelepipeds.

**UNIT III      LAPLACE TRANSFORMS****9+6**

Laplace transforms – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions – Derivatives and integrals of transforms – Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (Statement only) – Initial and final value theorems – Solution of linear ordinary differential equation of second order with constant coefficients using Laplace transformation techniques.

**UNIT IV      COMPLEX DIFFERENTIATION AND CONFORMAL MAPPING****9+6**

Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (Statement only) – Harmonic and orthogonal

properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping:  $w = z + k$ ,  $kz$ ,  $1/z$ ,  $z^2$  and bilinear transformation.

## UNIT V      COMPLEX INTEGRATION

**9+6**

Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula – Taylor’s and Laurent’s series expansions – Singular points – Residues – Statement and applications of Cauchy’s residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

**TOTAL: 75 PERIODS**

### OUTCOMES:

**After the successful completion of the course, the student will be able to**

- Solve the higher order linear differential equations.
- Determine the gradient of a scalar field, divergence and curl of a vector fields and interpret their physical meaning and evaluate line, surface and volume integrals by vector integration.
- Apply Laplace Transforms method for solving linear ordinary differential equation.
- Construct an analytic function and analyze conformal mapping.
- Evaluate the real integrals using complex integration.

### TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10<sup>th</sup> Edition, New Delhi, 2016.
2. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43<sup>rd</sup> Edition, 2014.
3. T. Veerarajan, "Engineering Mathematics", Tata McGraw Hill, 2<sup>nd</sup> Edition, New Delhi, 2011.

**REFERENCES:**

1. M. K. Venkataraman, "Engineering Mathematics, Volume II", 4<sup>th</sup> Edition, The National Publication Company, Chennai, 2003.
2. Sivaramakrishna Dass, C. Vijayakumari, "Engineering Mathematics", Pearson Education India, 4<sup>th</sup> Edition 2019.
3. H. K. Dass, and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Private Limited, 3<sup>rd</sup> Edition 2014.
4. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, 6<sup>th</sup> Edition, New Delhi, 2008.
5. S.S. Sastry, "Engineering Mathematics", Vol. I & II, PHI Learning Private Limited, 4<sup>th</sup> Edition, New Delhi, 2014.

<b>20ME103</b>	<b>COMPUTER AIDED ENGINEERING GRAPHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to ADS, CE, CSE, ECE, EEE, EIE, ME and IT)</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>4</b>

**OBJECTIVES:**

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

**UNIT I INTRODUCTION TO CONVENTIONS IN ENGINEERING DRAWING AND CAD**  
**COMMANDS** **18**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. Introduction to CAD commands- CAD user interface- coordinate systems, object selection methods, selection of units and precision. Sketching – line, circle, arc, polygon, rectangle and ellipse. Working with object snaps, layers and object properties. Editing the objects – copy, move, trim, extend, working with arrays, mirror, scale, hatch, fillet and chamfer. Conversion of simple pictorial diagrams to orthographic view using CAD software

**UNIT II PLANE CURVES** **16**

Basic Geometrical constructions, Curves used in engineering practices: Conics –

Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

### **UNIT III PROJECTION OF POINTS, LINES AND PLANE SURFACES 18**

Orthographic projection - principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces  
Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

### **UNIT IV PROJECTION OF SOLIDS AND PROJECTION OF SECTIONED SOLIDS 20**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method. Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.

### **UNIT V DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTION 18**

Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions.

**TOTAL: 90 PERIODS**

#### **OUTCOMES:**

At the end of the course, learners will be able to:

- Illustrate the fundamentals and standards of engineering drawing and apply the concepts of orthographic projections using CAD software.
- Interpret and construct various plane curves.
- Develop orthographic projections of points, lines and plane surfaces.
- Make use of concepts in projection to draw projections of solids and interpret

the concept in section of solids.

- Interpret and visualize development of surfaces.
- Interpret and visualize isometric projection of simple solids.

#### TEXT BOOKS:

1. Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 33<sup>rd</sup> Edition, 2020.
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 15<sup>th</sup> Edition, 2019.

#### REFERENCES:

1. Bhatt N.D. “Engineering Drawing”, Charotar Publishing House, 53rd edition 2019.
2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 3<sup>rd</sup> Edition, 2019.
3. Engineering Drawing Practice for Schools and Colleges BIS SP46:2003 (R2008), Published by Bureau of Indian Standards (BIS), 2008.
4. Parthasarathy. N.S and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2019.
5. Gopalakrishna. K.R., Engineering Drawing Vol 1 & 2, Subhas Publications, 27<sup>th</sup> Edition, 2017.

<b>20CH102</b>	<b>ENVIRONMENTAL SCIENCE AND ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to all Branches except CSBS)</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

#### OBJECTIVES:

The goal of this course is to enlighten and sensitize the students on environmental conservation and social issues. The course is designed to:

- Appreciate the natural resources of environment, which are inherently created for supporting life.
- Learn scientific and technological solutions to current day pollution issues.
- Study the interrelationship between living organisms and environment

- Understand the integrated themes of biodiversity.
- Appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

## **UNIT I NATURAL RESOURCES 11**

**Introduction** - scope and importance of environment – need for public awareness.

**Forest resources**- Use and over-exploitation, deforestation - timber extraction, mining, dams and their effects on forests and tribal people. **Water resources** - Use and over-utilization of surface and ground water, conflicts over water, dams-benefits and problems.

**Mineral resources**- Use and exploitation, environmental effects of extracting and using mineral resources. **Food resources**- World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer- pesticide problems, water logging, salinity. **Energy resources** - Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. **Land resources**- Land as a resource, land degradation, soil erosion and desertification – role of an individual in conservation of natural resources - case studies.

## **UNIT II POLLUTION AND ITS MANAGEMENT 11**

**Pollution** – causes, effects and control measures - Air pollution- Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear hazards - nuclear accidents and holocaust - role of an individual in prevention of pollution – case studies.

**Waste management** - causes, effects and control measures of municipal solid wastes, e-waste, plastic waste.

## **UNIT III ECOSYSTEMS AND BIODIVERSITY 9**

**Introduction to ecosystems** – structure and function of an ecosystem – energy flow in the ecosystem - ecological succession – food chains, food webs and ecological pyramids - types, characteristic features, structure and functions of - Forest ecosystem - Grassland ecosystem - Desert ecosystem - Aquatic ecosystems (lakes, oceans)

**Introduction to biodiversity** – types (genetic, species and ecosystem diversity) –values of biodiversity - threats to biodiversity - endangered and endemic species – conservation of

biodiversity (in-situ and ex-situ conservation) - India as a mega-diversity nation – hot-spots of biodiversity in India

#### **UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT**

**8**

**Sustainable development** – sustainable development goals - water conservation, rain water harvesting, watershed management – resettlement and rehabilitation - consumerism and waste products, value education.

**Disaster management**- floods, drought, earthquake, tsunami, cyclone and landslides - case studies. **Environmental ethics**- issues and possible solutions – environment protection act – air (prevention and control of pollution) act – water (prevention and control of pollution) act – wildlife protection act – forest conservation act.

#### **UNIT V HUMAN POPULATION AND THE ENVIRONMENT**

**6**

**Introduction** - population growth, variation among nations, population explosion, family welfare programme – women and child welfare - environment and human health – endemic/epidemic/pandemic, COVID – 19, HIV / AIDS– role of information technology in environment and human health – environmental impact assessment- case studies.

**TOTAL: 45 PERIODS**

#### **OUTCOMES:**

**Upon completion of the course, the students will be able to:**

- Illustrate the importance and conservation of natural resources.
- Assess the impact of various pollutants and suggest appropriate pollution control methods.
- Explain the basic structure of ecosystem and the conservation of biodiversity.
- Analyze the social issues related to environment and recommend suitable solutions.
- Investigate the trends in population explosion and assess its impact.

#### **TEXT BOOKS:**

1. Anubha Kaushik and C. P. Kaushik, “Perspectives in environmental studies”, New Age International, 6<sup>th</sup> edition, 2018.



2. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill, New Delhi, 2017.
3. Gilbert M. Masters, Wendell P. Ela “Introduction to Environmental Engineering and Science”, 3<sup>rd</sup> edition, Pearson Education, 2015.

**REFERENCES:**

1. William P. Cunningham and Mary Ann Cunningham, “Environmental Science: A Global Concern”, McGraw Hill, 14<sup>th</sup> edition, 2017.
2. G. Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India Pvt. Ltd., Delhi, 14<sup>th</sup> edition, 2014.
3. Erach Bharucha, “Textbook of Environmental Studies”, Universities Press Pvt. Ltd., Hyderabad, 2<sup>nd</sup> edition, 2015.

**20CS201****DATA STRUCTURES****L T P C****3 0 0 3****OBJECTIVES:**

- To understand the concepts of ADTs
- To learn linear data structures – lists, stacks, and queues
- To understand and apply Tree data structures
- To understand and apply Graph structures
- To analyze sorting, searching and hashing algorithms

**UNIT I LINEAR DATA STRUCTURES – LIST****9**

Algorithm analysis-What to analyze-running time calculations-Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation —singly linked lists-circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).



1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 2016.
2. Reema Thareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2014.

**REFERENCES:**

1. Narasimha Karumanchi, “Data Structure and Algorithmic Thinking with Python: Data Structure and Algorithmic Puzzles”, CareerMonk Publications, 2020.
2. Jean-Paul Tremblay and Paul Sorenson, “An Introduction to Data Structures with Application”, McGraw-Hill, 2017.
3. Mark Allen Weiss, “Data Structures and Algorithm Analysis in Java”, Third Edition, Pearson Education, 2012.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.
5. Ellis Horowitz, Sartaj Sahni, Dinesh P Mehta, “Fundamentals of Data Structures in C++”, Second Edition, Silicon Press, 2007.

**20CS202**

**PYTHON PROGRAMMING**  
(Lab Integrated Theory Course)

L	T	P	C
3	0	2	4

**OBJECTIVES:**

- To understand and write simple Python programs.
- To write Python programs using functions and understand recursion
- To solve problems using Python data structures — lists, tuples, dictionaries.
- To understand files, modules and packages in Python.
- To use Exceptions, Standard Libraries and IDE for application development.

**UNIT I INTRODUCTION TO PYTHON****9+6**

Introduction to Python programming – Arithmetic Operators - values and types - variables, expressions, statements – Functions – Conditionals and Recursion – Iteration.

**UNIT II FUNCTIONS****9+6**

Fruitful functions: Return Values, Incremental Development, Composition, Boolean functions, Recursion, Example, Checking Types – Strings: len, Traversal with a for loop, String slices, Immutable, Searching, Looping and Counting, String Methods, in Operator, String Comparison – Case Study: Word Play.

**UNIT III LISTS, DICTIONARIES, TUPLES****9+6**

Lists: Sequence, Mutable, Traversing, Operations, list slices, list methods, Map, Filter and Reduce, Deleting elements, Lists and Strings, Objects and Values, Aliasing, List Arguments.

Dictionaries: Mapping, Collection of Counters, Looping and Dictionaries, Reverse Lookup, Dictionaries and Lists, Memos, Global Variables.

Tuples: Immutable, Tuple Assignment, Tuple as Return Values, Variable-length Argument Tuples, Lists and Tuples, dictionaries and Tuples, Sequences of Sequences. Case Study: Data Structure Selection.

**UNIT IV FILES, MODULES, PACKAGES****9+6**

Files: Persistence, Reading and Writing, Format Operator, Filenames and Paths, Catching Exceptions - Modules: Importing a module, Packages, Creating a module.

**UNIT V EXCEPTIONS, LIBRARIES****9+6**

Exception Handling – Built-in Exceptions – Application Development with Python: Integrated Development Environment, Python Standard Library.

**LIST OF EXERCISES:**

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Operations on Tuples:
  - a. finding repeated elements

- b. slice a tuple
- c. reverse a tuple
- d. replace last value of a tuple

5. String manipulation

- a. Get a string from a given string where all occurrences of its first char have been changed to '\$', except the first char itself
- b. Python function that takes a list of words and returns the length of the longest one
- c. Python program to remove the characters which have odd index values of a given string
- d. Python program to count the occurrences of each word in a given sentence.
- e. Python program that accepts a comma separated sequence of words as input and prints the unique words in sorted form
- f. Python function to reverses a string if it's length is a multiple of 4

6. List operations

- a. Find the maximum of a list of numbers
- b. Python program to remove duplicates from a list.
- c. Python program to get the smallest number from a list.
- d. Python program to print a specified list after removing the 0th, 4th and 5th elements.
- e. Python program to print the numbers of a specified list after removing even numbers from it.
- f. Python program to find the second smallest number in a list.

7. Linear search and Binary search

8. Selection sort, Insertion sort

9. Merge sort

10. First n prime numbers

11. Multiply matrices

12. Programs that take command line arguments (word count)

13. Find the most frequent words in a text read from a file

14. Simulate elliptical orbits in Pygame

15. Simulate bouncing ball using Pygame

**TOTAL: 75 PERIODS**

**OUTCOMES:**

**Upon completion of the course, students will be able to**

- Implement simple Python programs.
- Develop Python programs using functions.
- Represent and solve compound data using Python lists, tuples, dictionaries.
- Implement and perform operations on files, modules and packages.
- Apply Exceptions, Standard Libraries and IDE for application development.

**TEXT BOOKS:**

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016  
(<http://greenteapress.com/wp/thinkpython/>)
2. Martin C. Brown, Python: The Complete Reference, Mc-Graw Hill, (Unit 4 – Chapter 5, Unit 5 – Chapter 7, 17)

**REFERENCES:**

1. David Beazley, Brian K. Jones, Python Cookbook, O'Reilly , Third Edition, 2013.
2. Reema Thareja, "Problem Solving and Programming with Python", 2<sup>nd</sup> Edition, Oxford University Press 2019.
3. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
4. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press , 2013
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015.
7. Kenneth A. Lambert, —Fundamentals of Python: First Programsll, CENGAGE Learning, 2012.
8. Charles Dierbach, —Introduction to Computer Science using Python: A Computational

Problem-Solving Focus, Wiley India Edition, 2013.

9. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3ll, Second edition, Pragmatic Programmers, LLC, 2013.

<b>20EM111</b>	<b>ENGINEERING PRACTICES LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to ADS, CE, CSE, ECE, ME and IT)</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

### **OBJECTIVES:**

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

### **GROUP A (CIVIL & MECHANICAL)**

#### **I CIVIL ENGINEERING PRACTICE**

**15**

#### **Buildings:**

- (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

#### **Plumbing Works:**

- (a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- (b) Study of pipe connections requirements for pumps and turbines.
- (c) Preparation of plumbing line sketches for water supply and sewage works.
- (d) Hands-on-exercise:  
Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
- (e) Demonstration of plumbing requirements of high-rise buildings.

#### **Carpentry using Power Tools only:**

- (a) Study of the joints in roofs, doors, windows and furniture.
- (b) Hands-on-exercise:

Woodwork, joints by sawing, planing and cutting.

## II MECHANICAL ENGINEERING PRACTICE

15

### **Welding:**

- (a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
- (b) Gas welding practice

### **Basic Machining:**

- (a) Simple Turning and Taper turning
- (b) Drilling Practice

### **Sheet Metal Work:**

- (a) Forming & Bending:
- (b) Model making – Trays and funnels.
- (c) Different type of joints

### **Machine assembly practice:**

- (a) Study of centrifugal pump
- (b) Study of air conditioner

### **Demonstration on:**

- (a) Smithy operations, upsetting, swaging, setting down and bending.  
Example Exercise – Production of hexagonal headed bolt.
- (b) Foundry operations like mould preparation for gear and step cone pulley.
- (c) Fitting: Exercises – Preparation of square fitting and V – fitting models.

### **OUTCOMES:**

On successful completion of this course, the student will be able to

- Develop carpentry components and pipe connections including plumbing works.
- Make use of welding equipments to join the structures
- Analyse the basic machining operations



- Develop the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings
- Fabricate carpentry components and pipe connections including plumbing works.

## **GROUP B (ELECTRICAL & ELECTRONICS)**

### **III ELECTRICAL ENGINEERING PRACTICE**

**15**

1. Study of various safety measures in Electrical System
2. Draw and demonstrate the layout for a residential house wiring using energy meter, switches, fuse, indicator, LED lamp, fluorescent lamp with one of the lamps to be controlled by 2 different switches
3. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit (series and parallel circuit).
4. Measurement of energy using single phase energy meter for incandescent lamp and LED lamp.
5. Measurement of resistance to earth of an electrical equipment

### **IV ELECTRONICS ENGINEERING PRACTICE**

**15**

1. Study of Electronic components (fixed and Variable):
  - i. Resistor – Measurement of resistance using colour coding and digital multimeter.
  - ii. Capacitor – Measurement of capacitance using identification code, LQR meter
  - iii. Inductor – Measurement of inductance using colour coding and LQR meter
2. Study of Electronic equipment:
  - i. Signal generation using AFO (sine, square, triangle for various frequency and amplitude ranges)
  - ii. Measurement of amplitude, frequency, peak-peak, RMS, period, DC level of sine, square and triangle waveform using CRO and DSO.
  - iii. Measurement of DC voltage and current using analog and digital meters

3. Study of Electronic accessories:
  - i. Circuit connection using Breadboard and wires.
  - ii. Circuit connection using general purpose PCB by Soldering practice techniques.
4. Study of logic gates AND, OR, EX-OR and NOT.
5. Generation of Clock Signal.
6. Measurement of ripple factor of HWR and FWR.
7. Study of Iron box, fan and regulator (resistive and electronics type), emergency lamp,  
Power Tools: (a) Range Finder (b) Digital Live-wire detector

**OUTCOMES:**

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

1. Carry out simple wiring as per the layout given.
2. Measure various electrical parameters like voltage, current, power factor, power, energy, resistance to earth etc.
3. Calculate ripple factor for a waveform and use logic gates for simple applications

**TOTAL: 60 PERIODS**

( Part A:30 periods and Part B : 30 periods)

<b>20CS211</b>	<b>DATA STRUCTURES LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To implement the basic data structures for solving simple problems.
- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms
- To get familiarized to sorting and searching algorithms

**LIST OF EXPERIMENTS:**

1. Array Manipulation
  - a. Find  $k^{\text{th}}$  smallest element in an unsorted array
  - b. Find the sub array with given sum
  - c. Matrix manipulations – Addition, Subtraction, Multiplication
  - d. Job Sequencing: Given an array of jobs where every job has a deadline and a profit. Profit can be earned only if the job is finished before the deadline. It is also given that every job takes a single unit of time, so the minimum possible deadline for any job is 1. How to maximize total profit if only one job can be scheduled at a time. Print the sequence of jobID order to maximize total profit.
2. String manipulations:
  - a. Reversing a set of words and count the frequency of each letter in the string.
  - b. Pattern Recognition - Find the number of patterns of form 1[0]1 where [0] represents any number of zeroes (minimum requirement is one 0) there should not be any other character except 0 in the [0] sequence in a given binary string.
  - c. Remove all the occurrences of string S2 in string S1 and print the remaining.
3. Pointers
  - a. Manipulating two dimensional arrays using pointers.
  - b. Print all permutations of a given string using pointers.
4. Dynamic Memory Allocation
  - a. Find Largest Number.
  - b. Print the list in reverse order.
5. Array implementation of List, Stack and Queue ADTs.
6. Linked list implementation of List, Stack and Queue ADTs.
7. Applications of List, Stack and Queue ADTs.
8. Implementation of Binary Trees and operations of Binary Trees.
9. Implementation of Binary Search Trees.
10. Implementation of AVL Trees.
11. Implementation of Heaps using Priority Queues.
12. Graph representation and Traversal algorithms.
13. Implement searching and sorting algorithms. Analyze and compare the time taken for various algorithms with best, average and worst case inputs.

**TOTAL: 60 PERIODS****OUTCOMES:****At the end of the course, the students will be able to:**

- Write functions to implement linear and non-linear data structure operations.
- Suggest and use appropriate linear / non-linear data structure operations for solving a given problem.
- Implement different operations of search trees.
- Implement appropriate Graph representations and traversals to solve real-world applications.
- Implement and analyze the various searching and sorting algorithms.

<b>20EL211</b>	<b>ADVANCED READING AND WRITING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**OBJECTIVES:**

The Course will enable learners to:

- Strengthen their reading skills.
- Enhance writing skills with specific reference to technical writing.
- Apply their critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.

**UNIT I** **6**

Reading - Strategies for effective reading - Writing -Write a descriptive paragraph - Predicting content using photos and title.

**UNIT II** **6**

Reading - Use of graphic organizers to review and aid comprehension. Writing - Write an opinion paragraph

**UNIT III** **6**

Reading - speed reading techniques - Writing - Elements of a good essay- Analytical Essay.

**UNIT IV** **6**

Reading - Genre and Organization of Ideas – Writing - Email writing - Job application

**UNIT V**

**6**

Reading - Critical reading and thinking -Writing - letter of recommendation - Vision statement

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**At the end of the course Learners will be able to:**

- Write different types of essays.
- Write winning job applications.
- Read and evaluate texts critically.
- Display critical thinking in various professional contexts.

**TEXT BOOKS:**

1. Debra Daise, CharlNorloff, and Paul Carne Reading and Writing (Level 4) Oxford University Press: Oxford, 2011.
2. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011.

**REFERENCES:**

1. Davis, Jason and Rhonda Liss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006.
2. Elbow, Peter. Writing Without Teachers. London: Oxford University Press, 1973. Print.
3. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan: Hyderabad, 2012.
4. Goatly, Andrew. Critical Reading and Writing. Routledge: United States of America, 2000.
5. Petelin, Roslyn and Marsh Durham. The Professional Writing Guide: Knowing Well and Knowing Why. Business & Professional Publishing: Australia, 2004.
6. Withrow, Jeans and et al. Inspired to Write. Readings and Tasks to develop writing skills. Cambridge University Press: Cambridge, 2004.

**SEMESTER III**

<b>20MA302</b>	<b>DISCRETE MATHEMATICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**OBJECTIVES:**

The syllabus is designed to

- validate the arguments by using connectives and rules of inference.
- develop the knowledge on the basics of counting, solving recurrence relations.
- demonstrate the fundamentals of graphs.
- illustrate the functions, relations and group theory.
- familiarize the concepts of lattices and Boolean algebra.

**UNIT I      LOGIC AND PROOFS      15**

Propositional logic – Propositional equivalences – Predicates and quantifiers – Nested quantifiers – Rules of inference – Introduction to proofs – Proof methods and strategy.

**UNIT II      COMBINATORICS      15**

Mathematical induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

**UNIT III      GRAPH THEORY      15**

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

**UNIT IV      ALGEBRAIC STRUCTURES      15**

Algebraic systems – Semi groups and monoids – Groups – Subgroups – Homomorphisms – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.

**UNIT V      LATTICES AND BOOLEAN ALGEBRA**

**15**

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – sublattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

**TOTAL: 75 PERIODS**

**OUTCOMES:**

After the successful completion of the course, the students will be able to:

CO1: Examine the validity of the arguments.

CO2: Demonstrate various proof techniques and application of principles.

CO3: Apply graph theory techniques to solve real life problems.

CO4: Identify algebraic techniques to formulate and solve group theoretic problems.

CO5: Utilize the significance of lattices and Boolean algebra in computer science and engineering.

**TEXT BOOKS:**

1. K.H. Rosen, "Discrete Mathematics and its Applications", 7<sup>th</sup> Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. J.P. Tremblay, and R. Manohar " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30<sup>th</sup> Reprint, 2011.

**REFERENCES:**

1. R.P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4<sup>th</sup> Edition, Pearson Education Asia, Delhi, 2007.
2. S. Lipschutz, and M. Lipson, "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3<sup>rd</sup> Edition, 2010.

3. T. Koshy. "Discrete Mathematics with Applications", Elsevier Publications, 1<sup>st</sup> Edition,

<b>20IT301</b>	<b>OBJECT ORIENTED PROGRAMMING PRINCIPLES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

2006.

### **OBJECTIVES:**

- To understand and represent any given business problem statement in object-oriented notation.
- To have in depth knowledge on various Core Java API's and methods
- To become proficient in Hands on exercise, and able to show case smart programming using Java as Core platform
- To apply multithreaded programming using Java
- To understand JDBC

### **UNIT I INTRODUCTION**

**9**

Description of the real world using the Objects Model - Classes, inheritance, interface, association, aggregation, composition with different aspect such as encapsulation, abstraction, polymorphism (static and runtime), access modifiers and multiple configurations - Quality software characteristics - Description of the Object Oriented Analysis process vs. the Structure Analysis Model

### **UNIT II JAVA BASICS**

**9**

Core Java Introduction, Object Oriented Programming in Core Java, Data Types, Auto and Un Boxing, Data Type Promotion, Inner and nested Classes, Control Statements, Logical Operators, abstract, super, final, static keywords

### **UNIT III ARRAYS, COLLECTIONS AND EXCEPTION**

**9**

Arrays – One and Multi-Dimensional, Cloning, Sorting, Hashing Technique, Purpose of equals and hashCode methods, Collections- List (ArrayList, LinkedList, Vector, Stack), Properties, Set(HashSet, TreeSet, LinkedHashSet), Map(Treemap, hashmap, treemap),



Queue (Priority Queue, DeQueue), Iteration, Ordering using Comparable and Comparator, Generics – Compile Time Type Safety, Upper and Lower Bounded, and with wild cards. Exception Handling – Checked and Un-Checked Exception, Custom Exception, Throws and Throw Keywords, Try-Catch-Finally, Try with Resources, Exception vs Runtime exception vs Throwable vs Error

#### **UNIT IV MULTITHREADING AND IO**

**9**

Concurrency and Parallelism Programming, Runnable, Threads approach, Threads Life Cycle, Fork and Join, wait, sleep, notify and yield. Executor Framework with Callable and Runnable options, Concurrent locks, Synchronized Collections (Concurrent Map, synchronized List, synchronized Map, synchronized Set, synchronizedSortedSet) Atomic data types (AtomicInteger, AtomicLong, AtomicIntegerArray), CountdownLatch ,Blocking Queue  
Java IO – Files, Pipes, Streams, Byte and Char arrays, Readers and Writers, Input and Output Stream, Byte Array Input and Output, Buffer Input and output

#### **UNIT V FUNCTIONAL PROGRAMMING AND LAMBDA**

**9**

Functional Programming (vs Object Oriented), imperative and declarative programming, Pure Functions, Functional Composition, Side Effects, Immutable, Java Functions and Predicates, Arrow Functions, @Functional interface, Higher Order Functions  
Streams API – Map, Filter, Reduce, Collect, Count, min and max Functions, Behavior as Parameterization, Seq and Parallel Streams, Converting a Array or File output as Streams  
JDBC – DataSource, Configurations, Connection, Connection Pools, Driver Types, ResultSet, Prepared Statement, Named Parameter, Embedded SQL (Insert, Update, Delete, Join, union etc), ResultSet Navigation, Connection Close and Clean up

**TOTAL: 45 PERIODS**

#### **OUTCOMES:**

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

CO1: Design and develop various applications in Java using OOD and Principles

CO2: Implement a given problem statement by selecting the right choice of options in Core Java.

CO3: Accomplish efficient programming in Core Java

CO4: Design and develop real time applications to process high volume of data with consistency and atomicity

CO5: Develop applications to Connect to Database using available thin drivers, and performs DDL operations.

### TEXT BOOKS:

1. Bernd Bruegge and Allen H Dutoit, "Object-Oriented Software Engineering Using UML, Patterns, and Java" Pearson ,3<sup>rd</sup> Edition, 2013.
2. Raoul-Gabriel Urma, Mario Fusco, Alan Mycroft, "Java 8 in Action: Lambdas, Streams, and functional-style programming", Manning Publications, 2015.
3. Sierra, Kathy, and Bert Bates. "Head First Java", CA: O'Reilly, 2005

### REFERENCES:

1. Schildt, Herbert, "Java: The Complete Reference", McGraw-Hill Education, Eleventh Edition.
2. R. Nageswara Rao, "Core Java an Integrated Approach (Black Book)", DT Editorial Services, 2016.

<b>20CS404</b>	<b>OPERATING SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### OBJECTIVES:

- To explain the basic concepts of operating systems and process.
- To discuss threads and analyse various CPU scheduling algorithms.
- To describe the concept of process synchronization and deadlocks.
- To analyse various memory management schemes.
- To describe I/O management and file systems.

### UNIT I INTRODUCTION TO OPERATING SYSTEMS AND PROCESSES 9

Introduction to OS –Computer system organization - architecture – Resource management - Protection and Security – Virtualization - Operating System Structures -

Services - User and Operating-System Interface - System Calls - System Services - Design and Implementation - Building and Booting an Operating System - Process Concept - Process Scheduling - Operations on Processes – Inter process Communication - IPC in Shared-Memory Systems - IPC in Message-Passing Systems

**UNIT II THREADS AND CPU SCHEDULING 9**

Threads & Concurrency: Overview - Multicore Programming - Multithreading Models - Thread Libraries - Implicit Threading - Threading Issues - CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Thread Scheduling - Multi-Processor Scheduling - Real-Time CPU Scheduling

**UNIT III PROCESS SYNCHRONISATION AND DEADLOCKS 9**

Process Synchronization - The critical-section problem, Peterson’s Solution - Synchronization hardware, Mutex locks, Semaphores, monitors, Liveness - Classic problems of synchronization – Bounded Buffer Problem - Reader’s & Writer Problem, Dinning Philosopher Problem, Barber’s shop problem. Deadlock - System model - Deadlock characterization, Methods for handling deadlocks - Deadlock prevention - Deadlock avoidance - Deadlock detection - Recovery from deadlock.

**UNIT IV MEMORY MANAGEMENT 9**

Memory Management: Contiguous Memory Allocation - Paging - Structure of the Page Table – Swapping - Virtual Memory: Demand Paging – Copy-on write – Page Replacement – Allocation of frames – Thrashing Memory – Compression

**UNIT V FILE MANAGEMENT 9**

File Management: File Concept – Access Methods – Directory Structure – Protection - Memory-Mapped File - Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks - I/O Hardware: I/O devices, Device controllers, Direct Memory Access - Case Study-Linux.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**At the end of this course, the students will be able to:**

CO1: Implement the basic concepts of operating systems and process.

CO2: Analyse various CPU scheduling algorithms and thread mechanism.

CO3: Implement the concepts of process synchronization and deadlocks.

CO4: Design various memory management schemes to given situation

CO5: Implement various I/O and file management techniques.

**TEXT BOOK:**

1. Silberschatz Abraham, Greg Gagne, Peter B. Galvin. "Operating System Concepts", Tenth Edition, Wiley, 2018.

**REFERENCES:**

1. William Stallings, Operating Systems – Internals and Design Principles, Pearson Education, New Delhi, 2018.
2. Achyut S.Godbole, Atul Kahate, Operating SystemsII, McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, "Modern Operating System", 4 th Edition, PHI Learning, New Delhi, 2018.

<b>20CS402</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to CSE, IT and ADS)</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To critically analyse the efficiency of alternative algorithmic solutions for the same problem
- To illustrate brute force and divide and conquer design techniques.
- To explain dynamic programming and greedy technique for solving various problems.
- To apply iterative improvement technique to solve optimization problems
- To examine the limitations of algorithmic power and handling it in different problems.

**UNIT I INTRODUCTION 8+3**

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency – Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms – Visualization.

**UNIT II BRUTE FORCE AND DIVIDE AND CONQUER 10+3**

Brute Force – Computing  $a^n$  – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort - Multiplication of Large Integers – Closest-Pair and Convex - Hull Problems - Decrease and Conquer Method: Josephus Problem-Transform and Conquer Method: Presorting

**UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 11+3**

Dynamic programming – Principle of optimality - Coin changing problem, Computing a Binomial Coefficient – Floyd’s algorithm – Multi stage graph - Optimal Binary Search Trees - Longest common subsequence - Matrix-chain multiplication – Travelling Salesperson Problem – Knapsack Problem and Memory functions. Greedy Technique – Prim’s algorithm and Kruskal’s Algorithm – 0/1 Knapsack problem - Huffman Trees.

**UNIT IV ITERATIVE IMPROVEMENT 7+3**

The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem.

**UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9+3**

Lower - Bound Arguments - P, NP NP- Complete and NP Hard Problems. Backtracking – N-Queen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Travelling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**At the end of this course, the students will be able to:**

CO1: Analyze the efficiency of recursive and non-recursive algorithms mathematically

CO2: Analyze the efficiency of brute force, divide and conquer, decrease and conquer, Transform and conquer algorithmic techniques

CO3: Implement and analyse the problems using dynamic programming and greedy technique algorithmic techniques.

CO4: Solve the problems using iterative improvement technique for optimization.

CO5: Compute the limitations of algorithmic power and solve the problems using backtracking and branch and bound technique.

**TEXT BOOKS:**

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Third Edition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2019.
3. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Third Edition, PHI Learning Private Limited, 2012.

**REFERENCES:**

1. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education, Reprint 2006.
2. Harsh Bhasin, Algorithms Design and Analysis, Oxford university press, 2016.
3. S. Sridhar, Design and Analysis of Algorithms, Oxford university press, 2014.
4. <http://nptel.ac.in/>

<b>20EC341</b>	<b>ANALOG AND DIGITAL COMMUNICATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES**

- To classify different types of Analog Modulation techniques, their principles.
- To infer the Principles of Data and Pulse Communication Systems.
- To understand and learn various digital communication techniques.
- To analyze and calculate the source and Error control coding.
- To illustrate and gain knowledge on multi-user radio communication.

**UNIT I ANALOG COMMUNICATION 9**

Introduction to Communication Systems, Modulation and its Types, Need for Modulation, Theory of Amplitude Modulation, Evolution and Description of SSB Techniques, Theory of Frequency and Phase Modulation, Comparison of Analog Communication Systems (AM – FM – PM).

**UNIT II PULSE AND DATA COMMUNICATION 9**

Pulse Communication: Pulse Amplitude Modulation (PAM), Pulse Time Modulation (PTM), Pulse Code Modulation (PCM) , Comparison of various Pulse Communication System (PAM – PTM – PCM).

Data Communication: History of Data Communication, Standards Organizations for Data Communication, Data Communication Circuits, Data Communication Codes, Basics of Serial and Parallel Interfaces.

**UNIT III DIGITAL COMMUNICATION 9**

Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK), Quadrature Amplitude Modulation (QAM) , 8 QAM, 16 QAM, Bandwidth Efficiency, Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

**UNIT IV SOURCE AND ERROR CONTROL CODING 9**

Entropy, Source Encoding Theorem, Shannon Fano Coding, Huffman Coding, Mutual Information, Channel Capacity, Error Control Coding, Linear Block Codes, Cyclic Codes, ARQ Techniques.

**UNIT V MULTI-USER RADIO COMMUNICATION 9**

Global System for Mobile Communications (GSM), Code Division Multiple Access (CDMA), Cellular Concept and Frequency Reuse, Channel Assignment and Handover Techniques, OFDM, Overview of Multiple Access Schemes, Principles of Satellite Technology.

**TOTAL: 45 Periods**

**OUTCOMES:**

**Upon completion of the course, the student should be able to:**

- CO1: Analyze the different types of Analog Communication Systems.
- CO2: Familiarize with Data Communication Techniques.
- CO3: Explore the different types of Pulse Communication Techniques.
- CO4: Analyze the various types of Digital Communication Schemes.
- CO5: Solve Source Coding and Error Control Coding problems.
- CO6: Apply the Principles of Multi-User Radio Communication.

**TEXT BOOKS:**

1. Wayne Tomasi, Electronic Communication Systems- Fundamental through Advanced, 5<sup>th</sup> Edition, Pearson Education, 2008.
2. Rappaport T.S, Wireless Communications: Principles and Practice, 2<sup>nd</sup> Edition, Pearson Education , 2010.

**REFERENCES:**





Combinational Circuits – Analysis and Design Procedures - Binary Adder-Subtractor - Decimal Adder - Binary Multiplier - Magnitude Comparator - Decoders – Encoders – Multiplexers - Introduction to HDL – HDL Models of Combinational circuits.

**UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 9 + 6 = 15**

Sequential Circuits - Storage Elements: Latches, Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits.

**UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC 9 + 6 = 15**

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

**UNIT V MEMORY AND PROGRAMMABLE LOGIC 9 + 6 = 15**

RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.

**LIST OF EXERCISES:**

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for code converters.
3. Design and implement Half/Full Adder and Subtractor.
4. Design and implement combinational circuits using MSI devices:
  - 4 – bit binary adder / subtractor
  - Application using multiplexers
5. Design and implement shift-registers.
6. Design and implement synchronous counters.
7. Coding combinational circuits using HDL.
9. Coding sequential circuits using HDL.

**TOTAL: 45 +30 = 75 PERIODS****OUTCOMES:****At the end of this course, the students will be able to:**

- CO1: Design and implement digital circuits using simplified Boolean functions
- CO2: Analyze, design and implement combinational circuits
- CO3: Analyze, design and implement synchronous and asynchronous sequential circuits
- CO4: Understand Programmable Logic Devices
- CO5: Develop HDL code for combinational and sequential circuits

**TEXT BOOK:**

1. M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", 6th Edition, Pearson Education, 2018.

**REFERENCES:**

1. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
2. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Seventh Edition, CENGAGE Learning, 2014
3. G. K. Kharate, Digital Electronics, Oxford University Press, 2010
4. Donald D. Givone, "Digital Principles and Design", Tata Mc Graw Hill, 2007.

<b>20IT311</b>	<b>OBJECT ORIENTED PROGRAMMING PRINCIPLES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>LABORATORY</b>				
		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To build software development skills using Java for real-world applications.
- To understand and apply the concepts of classes, object, inheritance, polymorphism.
- To develop database applications.

**LIST OF EXPERIMENTS:**

1. Implementation of an Application (such as Library Management System) using Classes, Objects, Constructors, Destructors and String Handling.
2. Implementation of an Application such as Student Information System using Inheritance, Virtual Functions and Abstract Classes.
3. Develop a Java application using class and objects to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff. If the type of the EB connection is domestic, calculate the amount to be paid as follows:
  - First 100 units - Rs. 1 per unit
  - 101-200 units - Rs. 2.50 per unit
  - 201
  - -500 units - Rs. 4 per unit
  - > 501 units - Rs. 6 per unitIf the type of the EB connection is commercial, calculate the amount to be paid as follows:
  - First 100 units - Rs. 2 per unit
  - 101-200 units - Rs. 4.50 per unit
  - 201 -500 units - Rs. 6 per unit
  - 501 units - Rs. 7 per unit 2.
4. Develop a Java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.
5. Write a program to perform string operations using Array List. Write functions for the following a. Append - add at end b. Insert – add at particular index c. Search d. List all string starts with given letter
6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area ( ) that prints the area of the given shape.
7. Write a Java program to implement user defined exception handling.

8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a Java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
10. Write a Java program to find the maximum value from the given type of elements using a generic function.
11. Develop Java database application with Employee class with Emp\_name, Emp\_id, Address, Mail\_id, Mobile\_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.

**TOTAL: 60 PERIODS**

## **OUTCOMES:**

### **At the end of the course, the students will be able to:**

- CO1: Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.
- CO2: Develop and implement Java programs with arraylist and exception handling.
- CO3: Develop and implement Java programs with inheritance and polymorphism.
- CO4: Design applications using file processing, generic programming and multithreaded programming.
- CO5: Develop real-world applications using OOP Concepts.

**20CS412****OPERATING SYSTEMS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To practice system calls and shell programming
- To implement various CPU scheduling algorithms
- To build inter process communication deadlock detection and avoidance algorithms.
- To design page replacement and disk scheduling algorithms
- To implement file allocation strategies

**LIST OF EXERCISES:**

1. Basic Unix file system commands such as ls, cd, mkdir, rmdir, cp, rm, mv, more, lpr, man, grep, sed, etc.
2. Shell Programming
3. Programs for Unix System Calls.
  - a. Write a program to fetch the below information; Name of the operating system, Current release level, Current version level, Total usable main memory size, Available memory size, Amount of shared memory, Memory used by buffers, Total swap space size, and Swap space still available.
  - b. Use system calls to imitate the action of UNIX command "ls" with option -a, and -li command
  - c. Use system calls to imitate the action of UNIX command "cp" or "dir" with a couple of options
  - d. Implement process life cycle: Use the system calls fork(), exec(), wait(), waitpid(), exit(0), abort() and kill().
4. Write a program to implement the following actions using pthreads
  - a) Create a thread in a program and called Parent thread, this parent thread creates another thread (Child thread) to print out the numbers from 1 to 20. The Parent thread waits till the child thread finishes

b) Create a thread in the main program, this program passes the 'count' as an argument to that thread function and this created thread function has to print your name 'count' times

5. Process Synchronization using Semaphores. A shared data has to be accessed by two categories of processes namely A and B. Satisfy the following constraints to access the data without any data loss.

(i) When a process A1 is accessing the database another process of the same category is permitted.

(ii) When a process B1 is accessing the database neither process A1 nor another process B2 is permitted.

(iii) When a process A1 is accessing the database process B1 should not be allowed to access the database.

Write appropriate code for both A and B satisfying all the above constraints using semaphores.

Note: The time-stamp for accessing is approximately 10 sec.

6. Implementation of IPC using Shared memory

a. Write a UNIX system call program to implement the following shared memory concept

i) In process 1 - Creation a shared memory of size 5 bytes with read/write permission and enter balance amount of Rs 1000.

ii) In process 2 – Add Rs. 200 to your balance. During this modification maintain the atomicity of shared memory using binary semaphore

iii) In process 3 – Subtract Rs. 800 to your balance. During this also modification maintain the atomicity of shared memory using binary semaphore

iv) In process 4 – Display the current balance of shared memory

v) Delete the shared memory

7. Implementation of IPC using message queue

- a) Get the input data (integer value) from a process called sender
- b) Use Message Queue to transfer this data from sender to receiver process
- c) The receiver does the prime number checking on the received data
- d) Communicate the verified/status result from receiver to sender process, This status should be displayed in the Sender process.

Note: Simultaneously execute two or more processes. Don't do it as a single process

8. Write C programs to implement the various CPU Scheduling Algorithms
9. Bankers Algorithm for Deadlock Avoidance
10. Implementation of Memory Allocation Methods for fixed partition
11. Implementation of Paging Technique of Memory Management
12. Implementation of Page Replacement Algorithms
13. Implementation of disk scheduling
14. Implementation of File Allocation Strategies

**TOTAL: 60 PERIODS**

**OUTCOMES:**

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

- CO1: Practice system calls and shell programming
- CO2: Implement various CPU scheduling algorithms
- CO3: Build inter process communication deadlock detection and avoidance algorithms.
- CO4: Design page replacement and disk scheduling algorithms
- CO5: Implement file allocation strategies



<b>20CS313</b>	<b>APTITUDE AND CODING SKILLS – I</b> <b>(Common to All Branches)</b>	<b>L T P C</b> <b>0 0 2 1</b>
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**OBJECTIVES:**

- To develop vocabulary for effective communication and reading skills.
- To build the logical reasoning and quantitative skills.
- To develop error correction and debugging skills in programming.

**List of Exercises:****1. English – Phase I**

Vocabulary: Synonyms, Antonyms, Grammar: Subject-Verb Agreement, Tenses and Articles, Prepositions and Conjunctions, Speech and Voices, Comprehension: Inferential and Literal Comprehension, Contextual Vocabulary, Comprehension ordering

**2. Logical Reasoning – Phase I**

Deductive Reasoning: Coding deductive logic, Directional sense, Blood relations, Objective Reasoning, Selection decision tables, Puzzles, Inductive reasoning: Coding pattern and Number series pattern recognition, Analogy and Classification pattern recognition, Abductive Reasoning: Logical word sequence, Data sufficiency

**3. Quantitative Ability - Phase I**

Basic Mathematics: Divisibility, HCF and LCM, Numbers, decimal fractions and power, Applied Mathematics: Profit and Loss, Simple and Compound Interest, Time, Speed and Distance, Engineering Mathematics: Logarithms, Permutation and Combinations, Probability

**4. Automata Fix – Phase I**

Logical, Compilation and Code reuse

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**At the end of this course, the students will be able to:**

CO1: Develop vocabulary for effective communication and reading skills.

CO2: Build the logical reasoning and quantitative skills.

CO3: Develop error correction and debugging skills in programming.

**SEMESTER IV****20MA402****PROBABILITY AND STATISTICS**  
**(Common to CSE, IT and ADS)**

L	T	P	C
3	2	0	4

**OBJECTIVES:**

The syllabus is designed to:

- Determine the probability value of one dimensional random variables.
- Illustrate the concepts of covariance, correlation and regression.
- Discuss the concept of testing of hypothesis for small and large samples.
- Demonstrate the difference between the types of design to experiments.
- Identify and interpret the control charts for variables and attributes.

**UNIT I      ONE DIMENSIONAL RANDOM VARIABLES      15**

Random variable – Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

**UNIT II      TWO DIMENSIONAL RANDOM VARIABLES      15**

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables.

**UNIT III      TESTING OF HYPOTHESIS      15**

Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests based on Normal distribution for single mean and difference of means – Tests based on t, Chi-square and F distributions for mean, variance and proportion – Contingency table (test for independent) – Goodness of fit.

**UNIT IV      DESIGN OF EXPERIMENTS      15**

One way and Two way classifications – Completely randomized design – Randomized block design – Latin square design.

**UNIT V STATISTICAL QUALITY CONTROL****15**

Control charts for measurements ( $\bar{X}$  and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits.

**TOTAL: 75 PERIODS****OUTCOMES:**

After the successful completion of the course, the students will be able to:

CO1: Understand the fundamental knowledge of modern probability theory and standard distributions.

CO2: Categorize the probability models and function of random variables based on one and two-dimensional random variables.

CO3: Employ the concept of testing the hypothesis in real life problems.

CO4: Implement the analysis of variance for real life problems.

CO5: Apply the statistical quality control in engineering and management problems.

**TEXT BOOKS:**

1. R.A. Johnson, I. Miller and J. Freund, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8<sup>th</sup> Edition, 2015.
2. J.S. Milton and J.C. Arnold, "Introduction to Probability and Statistics", Tata McGraw Hill, 4<sup>th</sup> Edition, 2007.

**REFERENCES:**

1. J.L. Devore, "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8<sup>th</sup> Edition, 2014.
2. A. Papoulis, and S. Unnikrishnapillai, Probability, "Random Variables and Stochastic Processes", McGraw Hill Education India, 4<sup>th</sup> Edition, New Delhi, 2010.
3. S.M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 3<sup>rd</sup> Edition, Elsevier, 2004.
4. M.R. Spiegel, J. Schiller and R.A. Srinivasan, "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
5. R.E. Walpole, R.H. Myers, S.L. Myers and K. Ye, "Probability and Statistics for

Engineers and Scientists". Pearson Education, Asia, 9<sup>th</sup> Edition, 2012.

<b>20IT401</b>	<b>SOFTWARE ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Lab Integrated Theory Course)</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>

### **OBJECTIVES:**

- To understand the phases and different process models in a software project
- To understand the methods of Agile Software Development
- To understand the concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures
- Identify the key activities in managing a software project

### **UNIT I SOFTWARE PROCESS AND AGILE METHODOLOGY**

**9+6**

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process- Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values. Extreme programming-XP Process.

### **UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION**

**9+6**

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary

### **UNIT III SOFTWARE DESIGN**

**9+6**

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components

**UNIT IV TESTING****9+6**

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

**UNIT V PROJECT MANAGEMENT****9+6**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I and II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

**LIST OF EXERCISES**

1. Development of requirements specification, function oriented design using SA/SD, object-oriented design using UML, test case design, implementation using Java and testing. Use of appropriate CASE tools and other tools such as configuration management tools, program analysis tools in the software life cycle
2. Develop the software project start-up, prototype model, using software engineering methodology and object-oriented design using UML for at least two real time scenarios
  - Problem Analysis and Project Planning -Thorough study of the problem –Identify Project scope, Objectives and Infrastructure
  - Software Requirement Analysis –Describe the individual Phases/modules of the project and Identify deliverables. Identify functional and non-functional requirements.
  - Data Modelling –Use work products –data dictionary.
  - Software Designing -Develop use case diagrams and activity diagrams, build and test classdiagrams, sequence diagrams and add interface to class diagrams.
  - Prototype model –Develop the prototype of the product.

**TOTAL: 45+30= 75 PERIODS****OUTCOMES****At the end of the course, the students will be able to:**

- CO1: Compare different process models.
- CO2: Implement the agile methodologies for software development.
- CO3: Apply the steps of requirements engineering process for Analysis Modeling.
- CO4: Apply systematic procedure for software design and deployment.
- CO5: Compare and contrast the various testing and maintenance.
- CO6: Evaluate the key activities in managing a software project.

**TEXT BOOKS:**

1. Roger S. Pressman, "Software Engineering – A Practitioners Approach", Mc Graw - Hill International Edition, Eighth Edition, 2014.
2. Ian Sommerville, "Software Engineering", Pearson Education Asia, Tenth Edition, 2015.

**REFERENCES:**

1. Rajib Mall, "Fundamentals of Software Engineering", PHI Learning Private Limited Fifth Edition, 2018.
2. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
3. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt. Ltd., 2009.
4. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, Seventh Edition, 2007.
5. <http://nptel.ac.in/>

<b>20IT402</b>	<b>WEB TECHNOLOGY - FOUNDATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To able to design and develop user friendly web application using latest Web Technology Stack
- To design application with high degree of Usability aspects
- To develop scalable and responsive application using Web Stack

- To focus on basics of Web Technology such as HTML, CSS and JS.
- To understand JQuery basis

## **UNIT I INTRODUCTION**

**9**

Introduction to Web Technology Stack, HTML5 and Features - Attributes, Heading, Paragraphs, Styles, Formatting, Quotations, Comments, Colors, Links, CSS, Images, Tables, List, Div, Form, Canvas CSS3 and Features - colors, backgrounds, Fonts, Images, links, tables, borders, margins, lists, padding, cursors, outlines, dimensions, scrollbars.

## **UNIT II HTML5 AND CSS3**

**9**

HTML5 Advanced - Web Storage, Web SQL Database, Web Socket, Canvas, Geolocation, Micro-Data, Drag and Drop, Web Workers, Indexed DB, Web Messaging, Web Cors, Form Validation, SVG Generator. CSS3 Advanced - Visibility, Positioning, Layers, Rules, Text Effects, Media Types, Paged Media, Aural, Printing, Layouts, Rounded Corners, Border Images, Animations, Gradients, Shadow, Web Font, 2d and 3d Transform, Box Sizing.

## **UNIT III INTRODUCTION TO JAVASCRIPT**

**9**

JavaScript Introduction and Features: - Operators, If-Else, Switch Case, DOM Manipulation, Functions, Events, Cookies, Page Redirect, Dialog Boxes, Void, Null Vs Undefined, let s const, this, Objects, Number, Boolean, Strings, Arrays, Date, Math, RegExp, Error Handling, Validations, Animation, Debugging

## **UNIT IV JQUERY**

**9**

jQuery - Dom Manipulation, Events Handling, Class and ID based selectors, Ajax Invocation, Animations, Forms Validations, Browser backward compatibility, Events, Effects, Traversing Plugins – Slidebar, MultiScroll, Draw svg, SlideShow, RowGrid

## **UNIT V ES6 JAVASCRIPT**

**9**

ES6 JavaScript - Variables, Syntax, this, Arrow Functions, Arrays, Classes and Objects, Inheritance, export, modules, promise, error handling, validations, Iterator, Collections, dom, date, string, loop and decision making

**TOTAL: 45 PERIODS**



## **OUTCOMES:**

### **At the end of the course, the students will be able to:**

CO1: Design and develop Web application using latest web tech stack

CO2: Accomplish Object-Oriented Programming model using ES6 format

CO3: Implement web development using jQuery

CO4: Develop responsive application that can be displayed in multiple devices.

CO5: Develop application with proper error handling.

## **TEXT BOOKS:**

1. Andy Harris, "HTML5 and CSS3 All-in-One For Dummies Book", 3<sup>rd</sup> Edition, 2014.
2. David McFarland, "JavaScript and JQuery: Interactive Front-End Web Development".

## **REFERENCES:**

1. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Fourth Edition, 2007 .
2. Deitel, Deitel, Goldberg, "Internet and World Wide Web How To Program", Pearson Education, Third Edition, 2006.
3. Marty Hall and Larry Brown, "Core Web Programming", Pearson Education, Second Edition, Volume I and II, 2001.
4. Bates, "Developing Web Applications", Wiley, 2006
5. [https://www.w3schools.com/js/js\\_es6.asp](https://www.w3schools.com/js/js_es6.asp)
6. <http://es6-features.org/>
7. <https://www.tutorialspoint.com/es6/index.htm>

**20CS401****COMPUTER ARCHITECTURE****L T P C****3 0 0 3****OBJECTIVES:**

- To describe the basic principles and operations of digital computers.
- To design arithmetic and logic unit for various fixed and floating point operations
- To construct pipeline architectures for RISC processors.
- To explain various memory systems & I/O interfacing
- To discuss parallel processor and multi-processor architectures

**UNIT I                    COMPUTER FUNDAMENTALS                    9**

Computer Types - Functional Units — Basic Operational Concepts — Number Representation and Arithmetic Operations - Performance Measurement — Instruction Set Architecture - Memory Locations and Addresses - Instructions and Instruction Sequencing - Addressing Modes.

**UNIT II                    COMPUTER ARITHMETIC                    9**

Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Unsigned Numbers - Multiplication of Signed Numbers - Fast Multiplication - Integer Division - Floating-Point Numbers and Operations.

**UNIT III                    BASIC PROCESSING UNIT AND PIPELINING                    10**

Basic Processing Unit: Concepts - Instruction Execution - Hardware Components - Instruction Fetch and Execution Steps -Control Signals - Hardwired Control.

Pipelining: Basic Concept - Pipeline Organization- Pipelining Issues - Data Dependencies - Memory Delays - Branch Delays - Resource Limitations - Performance Evaluation -Superscalar Operation.

**UNIT IV                    I/O AND MEMORY                    8**

Input/Output Organization: Bus Structure - Bus Operation - Arbitration - Interface

Circuits - Interconnection Standards - USB, SATA. The Memory System: Basic Concepts - Semiconductor RAM Memories - Read-only Memories - Direct Memory Access - Memory Hierarchy - Cache Memories - Performance Considerations - Virtual Memory - Memory Management Requirements - Secondary Storage.

**UNIT V            PARALLEL PROCESSING AND MULTICORE COMPUTERS            9**

Parallel Processing: Use of Multiple Processors - Symmetric Multiprocessors - Cache Coherence - Multithreading and Chip Multiprocessors - Clusters - Nonuniform Memory Access Computers - Vector Computation - Multicore Organization.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**At the end of this course, the students will be able to:**

- CO1: Explain the basic principles and operations of digital computers.
- CO2: Design Arithmetic and Logic Unit to perform fixed and floating point operations
- CO3: Develop pipeline architectures for RISC Processors.
- CO4: Summarize Various Memory systems & I/O interfacing.
- CO5: Recognize Parallel Processor and Multi Processor Architectures

**TEXT BOOKS:**

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer organization, Tata McGraw Hill, Sixth edition, 2012.
2. David A. Patterson and John L. Hennessy Computer Organization and Design- The Hardware/Software Interface 5th edition, Morgan Kaufmann, 2013.

**REFERENCES:**

1. John P.Hayes, Computer Architecture and Organization, Third Edition, TataMcGraw Hill, 2012.
2. David A. Patterson and John L. Hennessy Computer Organization and Design- The Hardware/Software Interface, 6th edition, Morgan Kaufmann, 2021.
3. John L. Hennessy and David A. Patterson, Computer Architecture – A Quantitate Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition,2012.

<b>20IT403</b>	<b>DATABASE MANAGEMENT SYSTEMS</b> (Common to B.E.(CSE) and B.Tech. (IT))	<b>L T P C</b> <b>3 0 0 3</b>
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**OBJECTIVES**

- To understand the basic concepts of Data modeling and Database Systems.
- To understand SQL and effective relational database design concepts.
- To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To understand efficient data querying and updates, with needed configuration
- To learn how to efficiently design and implement various database objects and entities

**UNIT I DATABASE CONCEPTS 9**

Concept of Database and Overview of DBMS - Characteristics of databases, Database Language, Types of DBMS architecture – Three-Schema Architecture -Introductions to data models types- ER Model- ER Diagrams Extended ER Diagram reducing ER to table Applications: ER model of University Database Application.

SQL fundamentals Views - Integrity Procedures, Functions, Cursor and Triggers Embedded SQL Dynamic SQL

**UNIT II DATABASE DESIGN 9**

Design a DB for Car Insurance Company - Draw ER diagram and convert ER model to relational schema. Evaluating data model quality - The relational Model Schema Keys- Relational Algebra Domain Relational Calculus- Tuple Relational Calculus - Fundamental operations. Relational Database Design and Querying Undesirable Properties of Relations Functional Dependency: Closures- Single Valued Dependency Single valued Normalization (1NF, 2NF 3NF and BCNF) - Desirable properties of Decompositions 4NF - 5NF De-normalization

**UNIT III      TRANSACTIONS      9**

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery

**UNIT IV      DATA STORAGE AND QUERYING      9**

RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Overview of physical storage structure- stable storage, failure classification -log based recovery, deferred database modification, check-pointing-File Structures:-Index structures-Primary, Secondary and clustering indices. Single and multilevel indexing. Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation

**UNIT V      ADVANCED TOPICS      9**

Distributed database Implementation Concurrent transactions - Concurrency control Lock based Time stamping-Validation based. NoSQL, NoSQL Categories - Designing an enterprise database system - Client Server database

**TOTAL: 45 PERIODS****OUTCOMES:****At the end of the course, the students will be able to:**

- CO1: Implement SQL and effective relational database design concepts.
- CO2: Map ER model to Relational model to perform database design effectively
- CO3: Compare and contrast various indexing strategies in different database systems
- CO4: Implement queries using normalization criteria and optimization techniques
- CO5: Analyze how advanced databases differ from traditional databases.
- CO6: Design and deploy an efficient and scalable data storage node for varied kind of application requirements

**TEXT BOOKS:**

1. Elmasri R. and S. Navathe, “Fundamentals of Database Systems”, Pearson Education, 7<sup>th</sup> Edition, 2016.
2. Abraham Silberschatz, Henry F.Korth, “Database System Concepts”, Tata McGraw Hill , 7<sup>th</sup> Edition, 2021.
3. Elmasri R. and S. Navathe, “Database Systems: Models, Languages, Design and Application Programming”, Pearson Education, 2013.

## REFERENCES:

1. Raghu Ramakrishnan, Gehrke “Database Management Systems”, MCGraw Hill, 3<sup>rd</sup> Edition 2014.
2. Plunkett T., B. Macdonald, “Oracle Big Data Hand Book” , McGraw Hill, First Edition, 2013
3. Gupta G K , “Database Management Systems” , Tata McGraw Hill Education Private Limited, New Delhi, 2011.
4. C. J. Date, A.Kannan, S. Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2015.
5. Maqsood Alam, Aalok Muley, Chaitanya Kadaru, Ashok Joshi, Oracle NoSQL Database: Real-Time Big Data Management for the Enterprise, McGraw Hill Professional, 2013.
6. Thomas Connolly, Carolyn Begg, “ Database Systems: A Practical Approach to Design, Implementation and Management”, Pearson , 6<sup>th</sup> Edition, 2015.

<b>20GE301</b>	<b>UNIVERSAL HUMAN VALUES 2: UNDERSTANDING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>HARMONY</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>

## OBJECTIVES:

The objective of the course is fourfold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence

- Strengthening of self-reflection.
- Development of commitment and courage to act.

### **COURSE TOPICS:**

The course has 28 lectures (2 lecture hours) and 14 practice sessions (2 Tutorial hour) in 5 Units:

#### **UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

#### **UNIT 2: Understanding Harmony in the Human Being – Harmony in Myself!**

7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
8. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
11. ‘Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

### **UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

14. Understanding the meaning of Trust; Difference between intention and competence

15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

### **UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as coexistence**

18. Understanding the harmony in the Nature

19. Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self regulation in nature

20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space

21. Holistic perception of harmony at all levels of existence.



Include practice sessions to discuss human being as cause of imbalance innature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

## **UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics**

22. Natural acceptance of human values

23. Definitiveness of Ethical Human Conduct

24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

26. Case studies of typical holistic technologies, management models and production systems.

27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

### **READINGS:**

### **TEXTBOOK:**

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

### **REFERENCES:**

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5. Small is Beautiful-E. F Schumacher.
6. Slow is Beautiful-Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India – by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom – Maulana Abdul Kalam Azad
12. Vivekananda-Romain Rolland (English)
13. Gandhi-Romain Rolland (English)

### OUTCOMES:

By the end of the course, students

- CO1: Would become more aware of themselves, and their surroundings (family, society, nature);
- CO2: Would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- CO3: Would have better critical ability.
- CO4: Would become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- CO5: Would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

<b>20IT411</b>	<b>WEB TECHNOLOGY LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

### OBJECTIVES:

- To develop UI using HTML5 and CSS3
- To design interactive web pages using Scripting languages.
- To learn jQuery.

### LIST OF EXPERIMENTS:

1. Develop an Wallet Application, that has following feature set
  - Login and Logout
  - Wallet
    - Add money to wallet
    - Spend money from wallet
    - Wallet transaction list
  - Services
    - Pay Mobile Bills – Post/Pre Paid bills
    - Pay Utility Bills
    - Pay Corp/Water Taxes
    - Pay via QR Code
2. The above application has to be Responsive, ES6 has to be used, jQuery model to manipulate the DOM structure, Object Oriented Programming model
3. Employ NodeJS to execute the above web application.

**TOTAL: 60 PERIODS**

### **OUTCOMES:**

#### **At the end of the course, the students will be able to:**

- CO1: Design simple web pages using markup languages like HTML and XHTML.
- CO2: Develop dynamic web pages using DHTML and java script that is easy to navigate and use.
- CO3: Implement server side web pages that have to process request from client-side web pages.
- CO4: Design and develop interactive and dynamic web pages using jQuery tool.
- CO5: Design and develop event driven web servers using NodeJS.

<b>20IT412</b>	<b>DATABASE MANAGEMENT SYSTEMS LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to B.E.(CSE) and B.Tech. (IT))</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

### **OBJECTIVES:**

- To understand data definitions and data manipulation commands
- To learn the use of nested and join queries

- To understand functions, procedures and procedural extensions of databases
- To be familiar with the use of a front-end tool
- To understand design and implementation of typical database applications

### **LIST OF EXPERIMENTS:**

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
  2. Database Querying – Simple queries, Nested queries, Sub queries and Joins
  3. Views, Sequences, Synonyms
  4. Database Programming: Implicit and Explicit Cursors
  5. Procedures and Functions
  6. Triggers
  7. Exception Handling
  8. Database Design using ER modeling, normalization and Implementation for any application
  9. Database Connectivity with Front End Tools
  10. Case Study using real life database applications anyone from the following list
    - a) Inventory Management for a EMart Grocery Shop
    - b) Society Financial Management
    - c) Cop Friendly App – Eseva
    - d) Property Management – eMall
    - e) Star Small and Medium Banking and Finance
- Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application.
  - Apply Normalization rules in designing the tables in scope.
  - Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features.
  - Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer.
  - Ability to showcase ACID Properties with sample queries with appropriate settings

**TOTAL: 60 PERIODS****OUTCOMES:****At the end of the course, the students will be able to:**

- CO1: Apply typical data definitions and manipulation commands.
- CO2: Design applications to test Nested and Join Queries
- CO3: Implement simple applications that use Views
- CO4: Implement applications that require a Front-end Tool
- CO5: Critically analyze the use of Tables, Views, Functions and Procedures.

<b>20CS414</b>	<b>APTITUDE AND CODING SKILLS – II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to All Branches)</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**OBJECTIVES:**

- To develop advanced vocabulary for effective communication and reading skills.
- To build an enhanced level of logical reasoning and quantitative skills.
- To develop error correction and debugging skills in programming.
- To apply data structures and algorithms in problem solving.

**List of Exercises:****1. English – Phase II**

Vocabulary: Synonyms, Antonyms, Grammar: Subject-Verb Agreement, Tenses and Articles, Prepositions and Conjunctions, Speech and Voices, Comprehension: Inferential and Literal Comprehension, Contextual Vocabulary, Comprehension ordering

**2. Logical Reasoning – Phase II**

Deductive Reasoning: Coding deductive logic, Directional sense, Blood relations, Objective Reasoning, Selection decision tables, Puzzles, Inductive reasoning: Coding pattern and Number series pattern recognition, Analogy and Classification pattern recognition, Abductive Reasoning: Logical word sequence, Data sufficiency

**3. Quantitative Ability - Phase II**

Basic Mathematics: Divisibility, HCF and LCM, Numbers, decimal fractions and power, Applied Mathematics: Profit and Loss, Simple and Compound Interest, Time, Speed and Distance, Engineering Mathematics: Logarithms, Permutation and Combinations, Probability

**4. Automata Fix – Phase II**

Logical, Compilation and Code reuse

**5. Automata - Phase II**

Data Structure Concepts: Array and Matrices, Linked list, String processing and manipulation, Stack/Queue, Sorting and Searching

Advanced Design and Analysis Techniques: Greedy Algorithms, Minimum Spanning Trees, String Matching, Divide and Conquer, Computational Geometry

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**At the end of this course, the students will be able to:**

CO1: Develop advanced vocabulary for effective communication and reading skills.

CO2: Build an enhanced level of logical reasoning and quantitative skills.

CO3: Develop error correction and debugging skills in programming.

CO4: Apply data structures and algorithms in problem solving.

Recommended By Board of Studies	No.: 2	Date: 06.08.2021
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