Sri SAI RAM INSTITUTE OF TECHNOLOGY
An Autonomous Institution
West Tambaram, Chennai - 44
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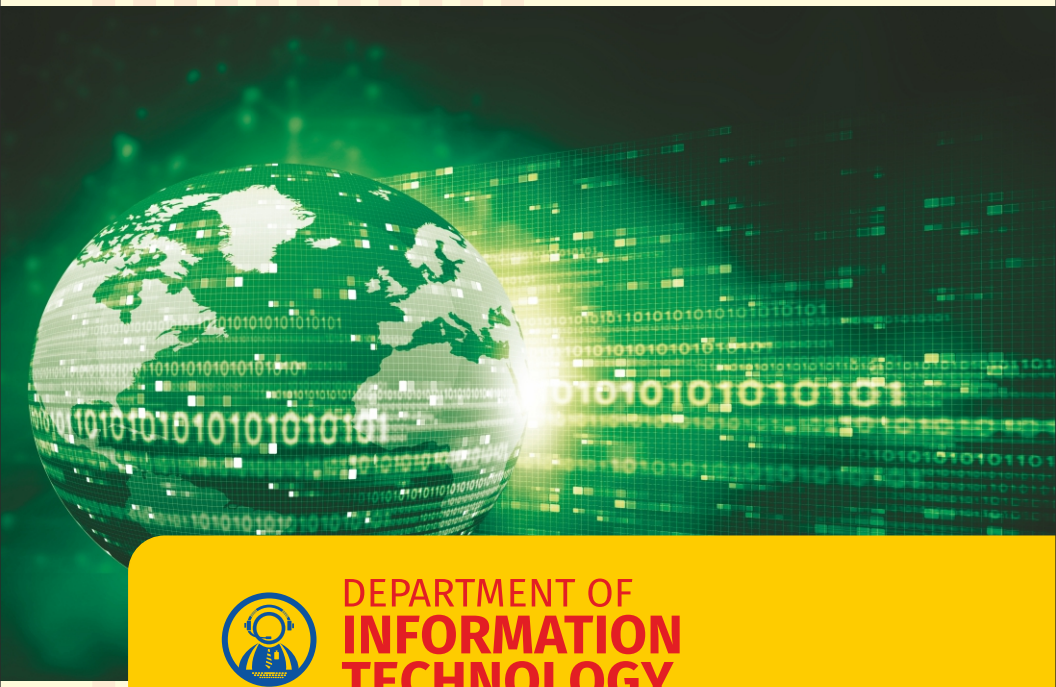
Approved by AICTE, New Delhi
Affiliated to Anna University



DEPARTMENT OF INFORMATION TECHNOLOGY

REGULATIONS 2020

Academic Year 2020-21 onwards

AUTONOMOUS CURRICULUM AND SYLLABUS I - VIII SEMESTERS

SRI SAIRAM INSTITUTE OF TECHNOLOGY

VISION

To be identified as a “Centre of Excellence” with high standards of Knowledge Dissemination and Research opportunities and to transform the students to imbibe qualities of technical expertise of international standards and high levels of ethical values, who in turn shall contribute to the advancement of society and human kind.

MISSION

We shall dedicate and commit ourselves to attain and maintain excellence in Technical Education through commitment and continuous improvement of infrastructure and equipment and provide an inspiring environment for Learning, Research and Innovation for our students to transform them into complete human beings with ethical and social values.

QUALITY POLICY

We at Sri Sai Ram Institute of Technology are committed to build a better nation through Quality Education with team spirit. Our students are enabled to excel in all values of Life and become Good Citizens. We continually improve the System, Infrastructure and Services to satisfy the Students, Parents, Industry and Society.

DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

To accomplish excellence in teaching, learning and research in Information and Communication that responds swiftly to the challenges of the industry and society.

MISSION

We shall devote ourselves to provide quality technical education with contemporary technologies through state-of-art research facilities and inspiring learning ambience to comprehend and promote innovation and research in Information and Communication. Also, to associate with diverse organizations to strengthen industry-academia relationships, to produce responsible intellectuals and researchers.

AUTONOMOUS CURRICULUM AND SYLLABI
Regulations 2020

SEMESTER I

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20BSMA101	Engineering Mathematics-I	3	1	0	4	4
2	20HSEN101	Technical English-I	3	0	0	3	3
3	20BSPH101	Engineering Physics	3	0	0	3	3
4	20BSCY101	Engineering Chemistry	3	0	0	3	3
5	20ESCS101	Problem solving and Programming in C	3	0	0	3	3
6	20ESGE101	Engineering Graphics	1	2	0	3	3
PRACTICAL							
7	20BSPL101	Physics and Chemistry Lab	0	0	3	3	1.5
8	20ESPL101	Programming in C lab	0	0	3	3	1.5
VALUE ADDITIONS - I							
9	20TPHS101	Skill Enhancement	0	0	2	2	1
10	20HSMG101	Personal Values	2	0	0	2	0
TOTAL						**29**	**23**

SEMESTER II

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20BSMA204	Discrete Structures	3	1	0	4	4
2	20HSEN201	Technical English - II	3	0	0	3	3
3	20BSPH203	Physics for Information Science	3	0	0	3	3
4	20BSCY201	Environmental Science and Engineering	3	0	0	3	3
5	20ESIT202	Python Programming	3	0	0	3	3
6	20ESIT203	Digital Principles and System Design	2	1	0	3	3
PRACTICAL							
7	20ESGE201	Engineering Practices Lab	0	0	3	3	1.5
8	20ESPL201	Python Programming Laboratory	0	0	3	3	1.5
9	20ESPL202	Digital Laboratory	0	0	3	3	1.5
VALUE ADDITIONS - II							
10	20TPHS201	Skill Enhancement	0	0	2	2	1
11	20HSMG201	Interpersonal Values	2	0	0	2	0
TOTAL						**33**	**24.5**

SEMESTER III

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20BSMA304	Statistics and Linear Algebra	3	1	0	4	4
2	20ITPC301	Data Structures	3	0	0	3	3
3	20CSPC301	Object Oriented Programming	2	1	0	3	3
4	20ITPC302	Software Engineering	3	0	0	3	3
5	20ITPC303	Computer Organization and Architecture	3	0	0	3	3
6	20ESEC301	Communication Engineering	3	0	0	3	3
PRACTICAL							
7	20ITPL301	Data Structures Laboratory	0	0	3	3	1.5
8	20CSPL301	Object Oriented Programming Laboratory	0	0	3	3	1.5
9	20ITTE301	Live-in-Lab – 1	0	0	2	2	1
VALUE ADDITIONS - III							
8	20ITTP301	Skill Enhancement	0	0	2	2	1
9	20MGMC301	Constitution of India	2	0	0	2	0
TOTAL						**31**	**24**

SEMESTER IV

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20BSMA402	Probability and queuing Theory	3	1	0	4	4
2	20CSPC402	Database Management Systems	3	0	0	3	3
3	20ITPC401	Design and Analysis of Algorithms	2	1	0	3	3
4	20CSPC401	Operating Systems	3	0	0	3	3
5	20CSPW401	Computer Networks with Laboratory	3	0	2	5	4
PRACTICAL							
6	20CSPL402	Database Management Systems Laboratory	0	0	3	3	1.5
7	20CSPL401	Operating Systems Laboratory	0	0	3	3	1.5
8	20ITTE401	Live-in-Lab 2	0	0	2	2	1
VALUE ADDITIONS - IV							
9	20ITTP401	Skill Enhancement	0	0	2	2	1
TOTAL						**28**	**22**

SEMESTER V

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1 `	20ITPW501	Statistical Analysis using R Programming with Laboratory	3	0	2	5	4
2	20ITPW502	Object Oriented Analysis and Design with Laboratory	3	0	2	5	4
3	20ITPC502	Web Technology	3	0	0	3	3
4	20ITPC503	Big Data Essentials	3	0	0	3	3
5	20ESEC502	Microprocessor and Microcontroller	3	0	0	3	3
PRACTICAL							
6	20ITPL501	Web Technology Laboratory	0	0	4	4	2
7	20ESPL501	Microprocessor & Microcontroller Laboratory	0	0	3	3	1.5
8	20ITTE501	Live-in-Lab 3	0	0	4	4	2
VALUE ADDITIONS - V							
9	20ITTP501	Skill Enhancement	0	0	2	2	1
TOTAL						**32**	**23.5**

SEMESTER VI

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20CSPC601	Artificial Intelligence	3	0	0	3	3
2	20ITPC601	Cloud Computing and Virtualization	3	0	0	3	3
3	20HSMG601	Principles of Engineering Management	3	0	0	3	3
4	20XXELXXX	Professional Elective - I	3	0	0	3	3
5	20XXOEXXX	Open Elective - 1	3	0	0	3	3
PRACTICAL							
6	20HSPL501	Communication and Soft Skills Lab	0	0	2	2	1
7	20ITPL602	Cloud Computing & Virtualization Laboratory	0	0	3	3	1.5
8	20CSPL601	Artificial Intelligence Laboratory	0	0	3	3	1.5
9	20ITPJ601	Innovative Design Project	0	0	2	2	1
VALUE ADDITIONS - VI							
10	20ITTP601	Skill Enhancement	0	0	2	2	1
TOTAL						**27**	**21**

SEMESTER VII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20ITPC701	Cryptography and Network Security	3	0	0	3	3
2	20ITPC702	Data Science with Machine Learning	3	0	0	3	3
3	20XXELXXX	Professional Elective II	3	0	0	3	3
4	20XXELXXX	Professional Elective III	3	0	0	3	3
5	20XXOEXXX	Open Elective - II	3	0	0	3	3
PRACTICAL							
6	20ITPL701	Cryptography and Network Security Lab	0	0	3	3	1.5
7	20ITPL702	Data Science Laboratory	0	0	3	3	1.5
8	20ITPJ701	Project Phase -1	0	0	4	4	2
VALUE ADDITIONS - VII							
9	20ITTP701	Skill Enhancement	0	0	2	2	1
TOTAL						**27**	**21**

SEMESTER VIII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20XXELXXX	Professional Elective-4	3	0	0	3	3
PRACTICAL							
2	20ITPJ801	Project Phase - 2	3	0	0	8	4
TOTAL						**11**	**7**

CREDIT DISTRIBUTION

Category	BS	ES	HS	EL	PC+PL	PW	OE	TE	PJ	TP	IS	MC	TOTAL
Credit	29.5	25.5	10	12	53	12	6	4	7	7	3	Y	169
Percentage	17.5	15.1	6.0	7.1	31.4	7.1	3.6	2.4	4.1	4.1	1.8	-	

*IS-Internship

PROFESSIONAL ELECTIVES - I

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDIT	STREAM
			L	T	P			
1	20ITEL601	Software Testing	3	0	0	3	3	Cyber Security
2	20ITEL602	Compiler Design	3	0	0	3	3	Machine Learning
3	20ITEL603	Cyber Security and Forensics	3	0	0	3	3	Cyber Security
4	20ITEL604	Network Programming Protocols and Standards	3	0	0	3	3	Cloud Computing
5	20CSEL501	Data Warehousing and Data Mining Techniques	3	0	0	3	3	Machine Learning
6	20ITEL605	Computer Graphics and Multimedia	3	0	0	3	3	Cloud Computing
7	20ITEL606	Mobile Application Development with Laboratory	3	0	0	3	3	Internet of Things
8	20ITEL607	Embedded Systems	3	0	0	3	3	Internet of Things
9	20ITEL608	Fundamentals of Edge and Soft Computing	3	0	0	3	3	AI & Machine Learning
10	20ITEL609	NoSQL Database Systems	3	0	0	3	3	Cloud Computing

PROFESSIONAL ELECTIVES - II

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDIT	STREAM
			L	T	P			
1	20ITEL701	C# and .Net Programming with Lab	3	0	0	3	3	Cyber Security
2	20ITEL702	Wireless Ad Hoc and Sensor Networks	3	0	0	3	3	Cloud Computing
3	20ITEL703	Information Storage and Management	3	0	0	3	3	Cyber Security
4	20CSEL601	Software Project Management	3	0	0	3	3	Internet of Things
5	20ITEL704	Service Oriented Architecture	3	0	0	3	3	Cloud Computing
6	20ITEL705	Visualization Techniques	3	0	0	3	3	Internet of Things
7	20CSEL502	Agile Methodologies	3	0	0	3	3	Machine Learning
8	20ITEL706	Digital Image Processing	3	0	0	3	3	Machine Learning
9	20ITEL707	Robotic Process Automation	3	0	0	3	3	Internet of Things
10	20ITEL708	Full Stack Software Development	3	0	0	3	3	Cloud Computing

PROFESSIONAL ELECTIVES - III

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDIT	STREAM
			L	T	P			
1	20MEPC702	Robotics and Applications	3	0	0	3	3	Machine Learning
2	20ITEL707	Soft Computing	3	0	0	3	3	Machine Learning
3	20ITEL708	Free & Open Source Software Tools	3	0	0	3	3	Cloud Computing
4	20ITEL709	Introduction to Internet of Things	3	0	0	3	3	Internet of Things
5	20ITEL710	Virtual and Augmented Reality	3	0	0	3	3	Internet of Things
6	20CSEL701	Social Network Analysis	3	0	0	3	3	Cloud Computing
7	20CSEL703	Information Retrieval Techniques	3	0	0	3	3	Cyber Security
8	20ITEL711	Fundamentals of Block Chain Technology With Laboratory	3	0	0	3	3	Cyber Security
9	20ITEL711	Storage Area Network	3	0	0	3	3	Cloud Computing
10	20ITEL712	Digital Forensics and Security		3	0	0	3 3	Data Analytics & Security

PROFESSIONAL ELECTIVES - IV

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDIT	STREAM
			L	T	P			
1	20ITEL801	Free and Open Source Software Tools	3	0	0	3	3	Cloud Computing
2	20ITEL802	Virtual and Augmented Reality	3	0	0	3	3	Internet of Things
3	20ITEL803	Intrusion Detection Systems	3	0	0	3	3	Data Analytics & Security
4	20CSEL802	Software Defined Networks	3	0	0	3	3	Cloud Computing
5	20ITEL804	Digital Image Processing	3	0	0	3	3	Computing & Information Systems
6	20ITEL805	Information System Audit	3	0	0	3	3	Computing & Information Systems
7	20ITEL806	Pattern Recognition Techniques	3	0	0	3	3	AI & Machine Learning
8	20CSEL707	Game Programming	3	0	0	3	3	AI & Machine Learning
9	20ITEL807	IoT Based Smart Systems	3	0	0	3	3	Internet of Things
10	20ITEL808	Web Security	3	0	0	3	3	Data Analytics & Security

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the B.Tech Information Technology Program will

PEO 1 Formulate, analyze and solve engineering problems with sound foundations in mathematical, scientific / basic engineering fundamentals in the field of Information and Communication and pursue higher studies.

PEO 2 Design, Develop and Deploy engineering solutions using state–of-the art Information Technologies in a diverse culture that addresses the needs of the society and industry.

PEO 3 Promote implementation of products and services in the recent technologies through good communication skills and leadership qualities.

PEO 4 Comprehend the impact of engineering projects on society and demonstrate ethical, professional implications / responsibilities in their work, guided by sustainable development through global interconnectedness.

PEO 5 Accomplish excellence by adhering to the changing direction in Information Technology through life-long learning and in research by being aware of recent research artifacts.

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Graduates of B.Tech Information Technology will be able to

PSO 1 Use and apply current technical concepts and practices in the core Information Technologies of human computer interaction, information management, programming, networking.

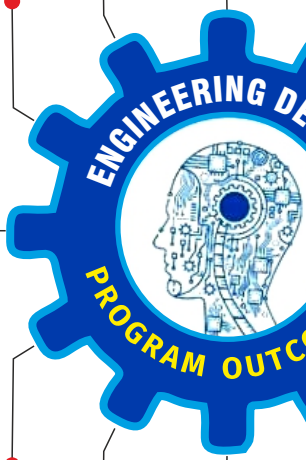
PSO 2 Effectively integrate IT-based solutions into the user environment

COMPONENTS OF THE CURRICULUM (COC)

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total Number of credits
Basic Sciences(BS)	17.5	31	29.5
Engineering Sciences(ES)	15.1	33	25.5
Humanities and Social Sciences (HS)	6.0	12	10
Professional Electives(EL)	7.1	9	12
Program Core+Program Lab (PC+PL)	31.4	70	53
Program theory with Lab (PW)	7.1	15	12
Open Electives (OE)	3.6	06	6
Talent Enhancement (TE)	2.4	08	4
Project (PJ)	4.1	14	7
Training & Placement (TP)	4.1	14	7
Internships/Seminars (IS)	1.8	-	3
Mandatory Courses (MC)	NA	06	NA
Total number of Credits		**218**	**169**

PROGRAMME OUTCOMES(POs)

PROGRAM OUTCOME REPRESENTS THE KNOWLEDGE, SKILLS AND ATTITUDES THAT THE STUDENTS WOULD BE EXPECTED TO HAVE AT THE END OF THE 4 YEAR ENGINEERING DEGREE PROGRAM



01 Engineering knowledge

Apply the basic principle and knowledge of mathematics, science and engineering principles to solve technical problems.

02 Problem Analysis

Identify and analyze complex engineering problems reaching logical conclusions using the basic principles of mathematics, science and engineering.

03 Development of solutions

Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs.

04 Investigate complex problems

Perform investigations, use research based knowledge and conduct experiments, analyze and interpret the results to provide valid conclusions.

05 Modern tool usage

Create, select and apply the latest techniques, resources and modern engineering / IT tools to develop appropriate solutions with an understanding of the limitations.

06 The Engineer and Society

Apply reasoning based on contextual knowledge to assess societal, legal and cultural issues with competency in professional engineering practices.

07 Environment & Sustainability

Demonstrate professional skills, knowledge and contextual reasoning to assess / environmental / societal issues for sustainable development.

08 Apply ethical principles

Apply ethical principles and commit to professional ethics and responsibilities based on the norms of professional engineering pratices.

09 Individual & Teamwork

Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary professional settings.

10 Communicate effectively

Communicate effectively amongst the engineering community, being able to comprehend & write effective reports, make presentations & give/receive clear instructions.

11 Project management

Demonstrate knowledge and apply the principles of engineering & management in their own / team projects in multidisciplinary environments.

12 Life-long learning

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

SEMESTER - I

20BSMA101 SDG NO. 4 & 9	ENGINEERING MATHEMATICS-I	L	T	P	C
		3	1	0	4

OBJECTIVES:

The intent of this course is

- To understand and gain knowledge in the concepts of matrix algebra
- To introduce the notion of limits, continuity, differentiation and maxima and minima of functions
- To acquaint the concept of definite and improper integrals and their applications
- To provide an understanding of double and triple integrals
- To acquire knowledge in representing elementary and periodic functions as an infinite series

UNIT I MATRICES 12

Symmetric, skew symmetric and orthogonal matrices; Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem(excluding proof) – Reduction of a Quadratic form to Canonical form using Orthogonal Transformation - Nature of Quadratic forms.

UNIT II DIFFERENTIAL CALCULUS 12

Limit, continuity, Differentiation rules - Maxima and Minima of functions of one variable, partial derivatives, Taylor's series for functions of two variables, Jacobian, Maxima & Minima of functions of several variables, saddle points, Method of Lagrange multipliers.

UNIT III INTEGRAL CALCULUS 12

Evaluation of definite and improper integral - Techniques of Integration- Substitution rule - Integration by parts, Integration of rational functions by partial fraction, Integration of irrational functions - Applications of definite integrals to evaluate surface areas and volumes of revolution.

UNIT IV MULTIPLE INTEGRALS 12

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

UNIT V SEQUENCES AND SERIES **12**

Introduction to sequences and series – power series – Taylor's series – series for exponential, trigonometric, logarithmic, hyperbolic functions – Fourier series – Half range Sine and Cosine series – Parseval's theorem.

TOTAL: 60 PERIODS

TEXTBOOKS:

1. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.
2. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, 11th Reprint, 2010.

REFERENCES:

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry", 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
3. T. Veerarajan, "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.
4. N.P. Bali and Manish Goyal, "A text-book of Engineering Mathematics", Laxmi Publications, Reprint, 2008.
5. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2014.

WEB REFERENCES:

1. https://math.mit.edu/~gs/linearalgebra/ila0601.pdf
2. http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter30/
3. https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/2.-partial-derivatives/
4. http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter31/

ONLINE RESOURCES:

1. https://www.khanacademy.org/math/linear-algebra/alternate-bases/eigen-everything/v/linear-algebra-introduction-to-eigenvalues-and-eigenvectors
2. https://www.khanacademy.org/math/differential-calculus

OUTCOMES:

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

1. Understand the concepts of symmetric, skew symmetric, orthogonal matrices, properties of Eigen values and eigen vectors, the nature of a quadratic form, sequences and series, power series representation of

functions, series representation of exponential, trigonometric logarithmic and hyperbolic functions. (K2)

2. Compute the eigen values, eigen vectors of a matrix, diagonalize the quadratic form using orthogonal transformation and find the inverse and higher powers of a matrix using Cayley Hamilton theorem. (K3)
3. Calculate the limit, derivative, partial derivatives, Jacobians of simple functions and evaluate integrals of single variable using the rules of integration. (K3)
4. Determine the Taylor series representation of functions of one variable and two variables and evaluate maxima and minima of functions of one variable, two variables and several variables. (K3)
5. Evaluate double integrals using change of order technique, double and triple integrals using change of variables technique and calculate surface areas and volume of solids of revolution. (K3)
6. Compute the Fourier series, Sine and Cosine series representation of functions defined in a period and use Fourier series and Parseval's theorem to find the value of infinite series. (K3)

CO - PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	-	-	-	-	1
CO2	3	3	2	1	-	-	-	-	-	-	-	1
CO3	3	3	2	1	-	-	-	-	-	-	-	1
CO4	3	3	2	1	-	-	-	-	-	-	-	1
CO5	3	3	2	1	-	-	-	-	-	-	-	1
CO6	3	3	2	1	-	-	-	--	-	-	-	1

SEMESTER - I

20HSEN101 SDG NO. 4	TECHNICAL ENGLISH - I	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop the basic LSRW skills of the students
- To encourage the learners to adapt to listening techniques
- To help learners develop their communication skills and converse fluently in real contexts

- To help learners develop general and technical vocabulary through reading and writing tasks
- To improve the language proficiency for better understanding of core subjects

UNIT I INTRODUCTION 9

Listening – short texts – formal and informal conversations - **Speaking** – basics in speaking – speaking on given topics & situations – recording speeches and strategies to improve - **Reading –** critical reading – finding key information in a given text – shifting facts from opinions - **Writing –** free writing on any given topic – autobiographical writing - **Language Development** – tenses – voices- word formation: prefixes and suffixes – parts of speech – developing hints

UNIT II READING AND LANGUAGE DEVELOPMENT 9

Listening - long texts - TED talks - extensive speech on current affairs and discussions -Speaking – describing a simple process – asking and answering questions - **Reading** comprehension – skimming / scanning / predicting & analytical reading – question & answers – objective and descriptive answers –identifying synonyms and antonyms - process description - **Writing** instructions – **Language Development** – writing definitions – compound words - articles – prepositions

UNIT III SPEAKING AND INTERPRETATION SKILLS 9

Listening - dialogues & conversations - **Speaking** – role plays – asking about routine actions and expressing opinions - **Reading** longer texts & making a critical analysis of the given text - **Writing** – types of paragraph and writing essays – rearrangement of jumbled sentences - writing recommendations - **Language Development** – use of sequence words - cause & effect expressions - sentences expressing purpose - picture based and newspaper based activities – single word substitutes

UNIT IV VOCABULARY BUILDING AND WRITING SKILLS 9

Listening - debates and discussions – practicing multiple tasks – self introduction – **Speaking** about friends/places/hobbies - **Reading** -Making inference from the reading passage – Predicting the content of the reading passage - **Writing** – informal letters/e-mails - **Language Development** - synonyms & antonyms - conditionals – if, unless, in case, when and others – framing questions.

UNIT V LANGUAGE DEVELOPMENT AND TECHNICAL WRITING 9

Listening - popular speeches and presentations - Speaking - impromptu

speeches & debates - **Reading** - articles – magazines/newspapers **Writing** – essay writing on technical topics - channel conversion – bar diagram/ graph – picture interpretation - process description - **Language Development** – modal verbs - fixed / semi-fixed expressions – collocations

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Board of Editors. Using English: A Coursebook for Undergraduate Engineers and Technologists. Orient Blackswan Limited, Hyderabad: 2015.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai, 2011.

REFERENCES:

1. Anderson, Paul V. Technical Communication: A Reader – Centered Approach. Cengage, New Delhi, 2008.
2. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason, USA, 2007.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford, 2007.
4. Chauhan, Gajendra Singh and et.al.Technical Communication (Latest Revised Edition). Cengage Learning India Pvt. Limited, 2018.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. http://engineeringvideolectures.com/course/696

ONLINE RESOURCES:

1. https://www.pearson.com/english/catalogue/business-english/technical-english.html
2. https://www.cambridgeenglish.org/learning-english/free-resources/

OUTCOMES:

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

1. Comprehend conversations and talks presented in English (K2)
2. Speak fluently in informal and formal contexts (K1)
3. Read articles of any kind and be able to comprehend (K2)
4. Write technical concepts in simple and lucid style (K2)
5. Prepare informal letters and e-mails efficiently (K3)
6. Present technical concepts and summaries in correct grammar and vocabulary (K1)

CO - PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	-	-	-	1	-	-	3	-	-
CO2	1	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	2
CO4	-	3	-	-	-	-	-	-	2	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	-	-	-	2	-

SEMESTER - I

20BSPH101 SDG NO. 4	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To educate and enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology

UNIT I CRYSTAL PHYSICS **9**

Single crystalline, Polycrystalline and Amorphous materials - single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal - Miller indices - Interplanar distance - Powder diffraction method - Debye Scherer formula - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - packing factor for SC, BCC, FCC and HCP structures - Polymorphism and allotropy - Diamond and Graphite structure (qualitative) - Growth of single crystals: Solution and Melt growth Techniques.

UNIT II PROPERTIES OF MATTER **9**

Elasticity - Stress - strain diagram and its uses - Poisson's ratio - Relationship between three moduli of elasticity (qualitative) - Factors affecting elastic modulus and tensile strength - Twisting couple - shaft - Torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever: theory and experiment - uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT III QUANTUM PHYSICS **9**

Black body radiation - Planck's theory (derivation) - Compton effect: theory -

wave particle duality - electron diffraction - progressive waves - wave equation - concept of wave function and its physical significance - Schrödinger's wave equation - Time independent and Time dependent equations - particle in a box (one dimensional motion) - Tunneling (qualitative) - scanning tunneling microscope.

UNIT IV LASERS AND FIBER OPTICS **9**

Lasers: population of energy levels, Einstein's A and B coefficients derivation - pumping methods - resonant cavity, optical amplification (qualitative) - three level and four level laser - CO_2 laser - Semiconductor lasers: Homojunction and Heterojunction.

Fiber optics: Principle, Numerical aperture and Acceptance angle - Types of optical fibers (material, refractive index, mode) - Losses associated with optical fibers - Fiber Optical Communication system (Block diagram) - Fiber optic sensors: pressure and displacement.

UNIT V THERMAL PHYSICS **9**

Transfer of heat energy - thermal expansion of solids and liquids - bimetallic strips - thermal conduction, convection and radiation - heat conduction in solids (qualitative) - thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) - thermal insulation - applications: heat exchangers, refrigerators and solar water heaters.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. D.K. Bhattachary & T.Poonam, "Engineering Physics". Oxford University Press, 2015.
2. R.K. Gaur& S.L. Gupta, "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. B.K. Pandey & S.Chaturvedi, "Engineering Physics", Cengage Learning India, 2017.
4. V. Rajendran, "Engineering Physics", Mc Graw Hill Publications Ltd. New Delhi, 2014.
5. M.N. Avadhanulu& P.G. Kshirshagar, "A textbook of Engineering Physics", S. Chand & Co Ltd. 2016.

REFERENCES:

1. D. Halliday, . Resnick & J. Walker, "Principles of Physics", Wiley, 2015.
2. R.A. Serway, & J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2010.
3. N.K. Verma," Physics for Engineers", PHI Learning Private Limited, 2014.

4. P.A. Tipler & G. Mosca "Physics for Scientists and Engineers", W.H.Freeman, 2020.
5. Brijlal and Subramanyam, "Properties of Matter", S. Chand Publishing, 2018.
6. Shatendra Sharma & Jyotsna Sharma, "Engineering Physics", Pearson, 2018.

OUTCOMES :

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

1. Understand the basics of crystals, structures and crystal growth techniques (K3)
2. Select a right choice of materials based on their properties for potential applications / acquire fundamental knowledge on elasticity and its applications relevant to the field of engineering (K3)
3. Apply the advanced physics concepts of quantum theory to characterize the matter (K4)
4. Understand the basic concepts in laser and its types and fiber optics (K3)
5. Acquire adequate knowledge on the fundamental concepts of thermal properties of materials (K2)
6. Evaluate the applications of powder diffraction method, optical fibers in sensors, quantum mechanical tunneling and thermal materials in expansion joints and heat exchangers (K4)

CO - PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	-	-	-	-	-	-	-	1
CO2	3	2	3	3	-	-	2	-	-	-	-	3
CO3	3	3	3	2	-	-	3	-	-	-	-	2
CO4	3	3	3	3	-	-	-	-	-	-	-	3
CO5	3	3	3	3	-	-	3	-	-	-	-	3
CO6	3	3	3	3	-	-	3	-	-	-	-	3

SEMESTER - I

20BSCY101 SDG NO. 4,6&7	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques
- To illustrate the principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials
- To categorize types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels
- To demonstrate the principles and generation of energy in batteries, nuclear reactors, solar cells, windmills and fuel cells
- To recognize the applications of polymers, composites and nano-materials in various fields

UNIT I WATER TECHNOLOGY AND SURFACE CHEMISTRY 9

Water Technology : Introduction – Hard water and Soft water. Hardness of water – types – expression of hardness (numerical problems). Boiler troubles – scale and sludge, priming and foaming, caustic embrittlement and boiler corrosion. Treatment of boiler feed water – Internal treatment (carbonate, phosphate, calgon, colloidal and sodium aluminate conditioning). External treatment – Ion exchange process, Zeolite process –Domestic water treatment (break point chlorination) –Desalination of brackish water – Reverse Osmosis.

Surface Chemistry: Adsorption – types – adsorption of gases on solids – adsorption of solutes from solution – applications of adsorption –role of adsorbents in catalysis and pollution abatement.

UNIT II ELECTROCHEMISTRY AND CORROSION 9

Electrochemistry: Cells – types (electrochemical and electrolytic cell) Redox reaction – single electrode potential (oxidation potential and reduction potential) – measurement and applications –Nernst equation (derivation and problems) – electrochemical series and its significance.

Corrosion: Causes, factors and types – chemical and electrochemical corrosion (galvanic, differential aeration). Corrosion control – material selection and design aspects, cathodic protection methods (sacrificial anodic and impressed current cathodic method) and corrosion inhibitors. Paints: Constituents and its functions. Electroplating of Copper and electroless plating of Nickel.

UNIT III FUELS AND COMBUSTION 9

Fuels: Introduction – classification of fuels – Coal – analysis of coal (proximate and ultimate). Carbonization – manufacture of metallurgical coke (Otto Hoffmann method) – Petroleum – manufacture of synthetic petrol (Bergius process). Knocking – octane number and cetane number – Gaseous fuels – Compressed natural gas (CNG), Liquefied petroleum gases (LPG). Biofuels – Gobar gas and Biodiesel.

Combustion of Fuels: Introduction – calorific value – higher and lower calorific values- theoretical calculation of calorific value – flue gas analysis (ORSAT Method).

UNIT IV ENERGY SOURCES AND STORAGE DEVICES 9

Energy sources: Nuclear fission – nuclear fusion – differences between nuclear fission and fusion – nuclear chain reactions – nuclear energy – light water nuclear power plant – breeder reactor – solar energy conversion – solar cells – wind energy.

Storage devices: Batteries – types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium–ion–battery), fuel cells – H_2 -O_2 fuel cell and super capacitors.

UNIT V POLYMERS AND NANOMATERIALS 9

Polymers: Classification – types of polymerization – mechanism (Free radical polymerization) –Engineering polymers: Nylon–6, Nylon–6,6, Teflon, Kevlar and PEEK – preparation, properties and uses – Plastic and its types – Conducting polymers – types and applications. Composites – definition, types, polymer matrix composites – FRP.

Nanomaterials: Introduction – Nanoparticles, Nanoclusters, Nanorods, Nanotubes (CNT: SWNT and MWNT) and Nanowires – Properties (surface to volume ratio, melting point, optical and electrical), Synthesis (precipitation, thermolysis, hydrothermal, electrodeposition, chemical vapour deposition, laser ablation, sol-gel process) and Applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015.
2. P. C. Jain and Monika Jain, "Engineering Chemistry" DhanpatRai Publishing Company (P) LTD, New Delhi, 2015.
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

OUTCOMES

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

1. Identify the origin of water resources and develop innovative methods to produce soft water for industrial use and potable water at cheaper cost. (K2)
2. Recognize the basic design of adsorption systems and its industrial applications and the basics concepts of electrochemistry to understand battery technology. (K2)
3. Apply the principles of electrochemistry to corrosion process and the applications of protective coatings to overcome the corrosion. (K3)
4. Disseminating the knowledge about the chemistry of fuels and combustion and its application in various levels.. (K2)
5. Acquire the basics of non-conventional sources of energy and understand the principles and the reaction mechanism of batteries and fuel cells. (K3)
6. Illustrate the synthesis and applications of polymers, composites and nano-materials. (K2)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	-	-	1	2	-	-	-	-	1
CO2	3	2	2	2	1	1	2	-	-	-	-	3
CO3	3	2	3	2	1	1	2	-	-	-	1	1
CO4	3	1	2	2	-	1	2	-	-	-	1	1
CO5	3	2	3	1	1	1	2	-	-	-	1	3
CO6	3	2	3	1	-	1	1	-	-	-	1	2

SEMESTER - I

20ESCS101 SDG NO. 4&9	PROBLEM SOLVING AND PROGRAMMING IN C	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand about the programming language
- To develop C Programs using basic Programming Constructs, Loops Arrays and Strings
- To develop applications in C using Functions , Pointers and Structures
- To perform I/O operations and File Handling in C

UNIT I INTRODUCTION TO PROGRAMMING AND ALGORITHMS FOR PROBLEM SOLVING 10

The Basic Model of Computation, Programming Paradigms- Program Development Life Cycle - Algorithm –Pseudo Code – Flow Chart - Programming Languages - Compilation - Linking and Loading - Testing and Debugging - Documentation - Control Structures – Algorithmic Problem Solving- Problems Based on Sequential, Decision Making - Branching and Iteration.

UNIT II BASICS OF C PROGRAMMING 8

Structure of C program - C programming: Data Types – Storage Classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions – Input / Output Statements - Assignment Statements – Decision making Statements - Switch Statement - Looping Statements – Pre-Processor Directives - Compilation Process

UNIT III ARRAYS AND STRINGS 9

Introduction to Arrays: Declaration, Initialization – One Dimensional Array – Example Program: Computing Mean, Median and Mode - Two Dimensional Arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String Operations: Length, Compare, Concatenate - Copy – Selection Sort - Linear and Binary Search.

UNIT IV FUNCTIONS AND POINTERS 9

Introduction to Functions: Function Prototype, Function Definition, Function Call, Built-in Functions (String Functions, Math Functions) – Recursion – Example Program: Computation of Sine Series - Scientific Calculator using Built-in Functions - Binary Search using Recursive Functions – Pointers – Pointer Operators – Pointer Arithmetic – Arrays and Pointers –

Array of Pointers – Example Program: Sorting of Names – Parameter Passing: Pass by Value - Pass by Reference – Example Program: Swapping of Two Numbers using Pass by Reference.

UNIT V STRUCTURES and FILE PROCESSING 9

Structure - Nested Structures – Pointer and Structures – Array of Structures – Example Program using Structures and Pointers – Self Referential Structures – Dynamic Memory Allocation - Singly Linked List – Typedef.

Files – Types of File Processing: Sequential Access, Random Access – Sequential Access File - Example Program: Finding Average of Numbers stored in Sequential Access File - Random Access File - Example Program: Transaction Processing Using Random Access Files – Command Line Arguments.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2012.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Publication.
2. Jeri R. Hanly & Elliot B. Koffman, "Problem Solving and Program Design in C", Pearson Education, 2013.
3. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
6. Kanetkar Y, "Let us C", BPB Publications, 2007.
7. Hanly J R & Koffman E.B, "Problem Solving and Programme design in C", Pearson Education, 2009.

WEB REFERENCES:

1. https://www.learn-c.org/
2. https://codeforwin.org/
3. https://www.cprogramming.com/

ONLINE RESOURCES:

1. https://www.linuxtopia.org/online_books/programming_books/gnu_c_programming_tutorial
2. https://nptel.ac.in/courses/106105171
3. https://swayam.gov.in/nd1_noc19_cs42/preview

OUTCOMES:

Upon completion of the course the student should be able to

1. Develop efficient algorithms for solving a problem. (K2)
2. Use the various constructs in C to develop simple applications. (K3)
3. Design and Implement applications using Array & Strings. (K3)
4. Develop applications using Functions and Pointers. (K6)
5. Design and Develop applications using Structures. (K3)
6. Design and Develop applications using Files. (K4)

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	-	2	2	-	3	2	3
CO2	3	3	3	3	2	-	1	1	2	2	3	3	2	3
CO3	3	3	3	3	2	1	1	1	2	-	3	-	3	2
CO4	3	3	3	3	2	1	-	1	2	2	3	3	1	2
CO5	3	3	3	3	2	1	1	1	2	2	3	3	2	1
CO6	3	3	3	3	2	1	1	1	2	2	3	3	3	2

SEMESTER - I

20ESGE101 SDG NO. 4,6,7, 9, 12,14 &15	ENGINEERING GRAPHICS	L	T	P	C
		1	2	0	3

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products
- To visualize the job in three dimensions
- To have a clear conception and appreciation of the shape, size, proportion and design
- To expose the student community to existing national standards related to technical drawings

CONCEPTS AND CONVENTIONS (Not for Examination) 3

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning- Projection of Points

UNIT I PLANE CURVES AND FREEHAND SKETCHING 6+9

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid on Horizontal Surfaces – construction of involutes of circle for one complete revolution – Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF LINES AND PLANE SURFACE 6+9

Orthographic projection- principles-Principal planes- 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- Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 6+9

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+9

Sectioning of prisms, pyramids, cylinder and cone in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and truncated solids in vertical position – Prisms, pyramids cylinder and cone.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+9

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinder, cone- Perspective projection of simple solids-Prisms, pyramids and cylinder by visual ray method.

TOTAL: 78 PERIODS

TEXT BOOKS:

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
2. T. Jeyapoovan, "Engineering Graphics using AUTOCAD", Vikas Publishing House Pvt Ltd, 7th Edition.

REFERENCES:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
3. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
4. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
5. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
6. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
7. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

WEB REFERENCES:

1. https://nptel.ac.in/courses/112/103/112103019/

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/104/105104148/

PUBLICATION OF BUREAU OF INDIAN STANDARDS:

1. IS10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods

OUTCOMES:

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

1. Relate thoughts and ideas graphically in a neat fashion and ability to perform sketching of engineering curves used in engineering practices, multiple views of objects. (K1)
2. Understand the concepts of orthographic projections for basic geometrical constructions. (K2)
3. Acquire the knowledge of orthographic projection in three dimensional object. (K2)
4. Develop knowledge about Sectioning and apply interior shapes of solids. (K3)
5. Analyze the concepts of design in developing various 3 dimensional projections. (K4)
6. Build a strong foundation to analyze the design in various dimensions. (K4)

CO - PO , PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	2	2	-	2	2	2
CO2	3	2	2	-	-	-	-	-	2	2	-	2	2	2
CO3	3	2	2	-	-	-	-	-	2	2	-	2	2	2
CO4	3	2	2	-	-	-	-	-	2	2	-	2	2	2
CO5	3	2	2	-	-	-	-	-	2	2	-	2	2	2
CO6	3	2	2	-	-	-	-	-	2	2	-	2	2	2

SEMESTER - I

20BSPL101 SDG NO. 4	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
		0	0	3	1.5

PHYSICS LABORATORY

OBJECTIVES:

- To acquaint the students with practical knowledge of physics principles in various fields such as optics, thermal physics and properties of matter for developing basic experimental skills
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis

LIST OF EXPERIMENTS (Any 5 Experiments)

1. Determination of Young's modulus by non-uniform bending method.
2. Determination of rigidity modulus –Torsion pendulum.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
4. (a) Determination of wavelength and particle size using Laser.
   (b) Determination of acceptance angle in an optical fiber.
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of specific resistance of a given coil of wire – Carey Foster's bridge.
7. Determination of wavelength of mercury spectrum – spectrometer grating.
8. Determination of band gap of a semiconductor.
9. Determination of Hall coefficient by Hall Effect experiment.
10. Determination of solar cell characteristics.

LAB REQUIREMENTS FOR A BATCH OF 30 STUDENTS / 6 (max.) STUDENTS PER EXPERIMENT

1. Young's modulus by non-uniform bending method-experimental set-up – 12 sets
2. Rigidity modulus - Torsion pendulum experimental set-up – 12 sets
3. Ultrasonic Interferometer to determine velocity of sound and compressibility of liquid – 6 sets
4. (a) Experimental set-up to find the wavelength of light, and to find particle size using Laser – 6 sets
   (b) Experimental set-up to find acceptance angle in an optical fiber – 6 sets
5. Lee's disc method- experimental set up to find thermal conductivity of a bad conductor – 6 sets
6. Experimental set-up to find specific resistance of a coil of wire-Carey Foster's Bridge – 6 sets
7. Experimental set-up to find the wavelength of mercury spectrum-spectrometer grating – 6 sets
8. Experimental set-up to find the band gap of a semiconductor – 12 sets
9. Experimental set-up to find the Hall coefficient by Hall Effect Experiment – 6 sets

10. Experimental set-up to study characteristics of solar cells – 6 sets

TEXTBOOKS:

1. J.D. Wilson& C.A. Hernandez Hall "Physics Laboratory Experiments" Houghton Mifflin Company, New York, 2010.
2. M.N. Srinivasan, S. Balasubramanian &R. Ranganathan, "Practical Physics", S. Chand & Sons educational publications, New Delhi, 2011.
3. R. Sasikumar, "Practical Physics", PHI Learning Pvt. Ltd., New Delhi, 2011.

CHEMISTRY LABORATORY

(Any five experiments to be conducted)

OBJECTIVES:

- To acquaint the students with practical knowledge of the basic concepts of chemistry, the student faces during the course of their study in the industry and engineering field
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis
- To understand and develop experimental skills for building technical competence

LIST OF EXPERIMENTS (Any five experiments to be conducted)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water samples.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Conductometric titration of strong acid vs strong base.
7. Estimation of iron content of the given solution using potentiometer.
8. Estimation of iron content of the water sample using spectrophotometer (1, 10- Phenanthroline / thiocyanate method).
9. Estimation of sodium and potassium present in water using flame photometers.
10. Determination of molecular weights of polymers using Ostwald's Viscometer.

LAB REQUIREMENTS FOR A BATCH OF 30 STUDENTS / 6 (MAX.) STUDENTS PER EXPERIMENT.

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample - 6 sets
2. Determination of total, temporary & permanent hardness of water by EDTA method - 6 sets
3. Determination of DO content of water sample by Winkler's method - 6sets
4. Determination of chloride content of water sample by argentometric method – 6 sets
5. Determination of strength of given hydrochloric acid using pH meter - 6 sets
6. Conductometric titration of strong acid vs strong base - 6 sets
7. Estimation of iron content of the given solution using potentiometer - 6 sets
8. Estimation of iron content of the water sample using spectrophotometer (1,10- Phenanthroline / thiocyanate method) - 2 sets
9. Estimation of sodium and potassium present in water using flame photometer - 2 sets
10. Determination of molecular weights of polymer using Ostwald's Viscometer. - 6 sets

TOTAL: 30 PERIODS

TEXTBOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis (8th edition, 2014).

OUTCOMES:

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

1. Apply the principles of thermal physics and properties of matter to evaluate the properties of materials and to determine the physical properties of liquid using ultrasonic interferometer. (K1)
2. Understand measurement technique and usage of new instruments in optics for real time application in engineering. (K2)
3. Apply the knowledge of semiconductor materials to evaluate the band gap and Hall coefficient of materials and to study the characteristics of solar cell for engineering solutions. (K3)

4. Apply the different techniques of quantitative chemical analysis to generate experimental skills in building technical competence.(K2)
5. Apply basic techniques used in chemistry laboratories for water analyses/purification and estimates the ions/metal ions present in domestic/industry wastewater. (K2)
6. Utilize the fundamental laboratory techniques for analyses such as volumetric titrations, conductometric, potentiometric and spectroscopy. (K2)

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	3	3	2	2	1	1	3
CO2	3	3	3	3	3	3	3	2	2	2	2	3
CO3	3	3	3	3	3	3	3	2	1	1	2	3
CO4	3	2	3	3	1	1	2	2	2	2	3	2
CO5	3	2	3	3	1	1	2	2	2	2	3	2
CO6	3	2	3	3	1	1	2	2	2	2	3	2

SEMESTER - I

20ESPL101 SDG NO. 4&9	PROGRAMMING IN C LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To develop programs in C using basic Programming Constructs
- To develop applications in C using Arrays and Strings
- To design and implement applications in C using Functions, Structures
- To develop applications in C using Files

LIST OF EXPERIMENTS

1. Write a program using I/O statements and expressions.
2. Write programs using decision-making constructs.
3. 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)

4. Write a program to perform the Calculator operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Write a program to check whether a given number is Armstrong number or not?
6. Write a program tocheck whether a given number is odd or even?
7. Write a program to find the factorial of a given number.
8. Write a program to find out the average of 4 integers.
9. Write a program to display array elements using two dimensional arrays.
10. Write a program to perform swapping using function.
11. Write a program to display all prime numbers between two intervals using functions.
12. Write a program to reverse a sentence using recursion.
13. Write a program to get the largest element of an array using the function.
14. Write a program to concatenate two string.
15. Write a program to find the length of String.
16. Write a program to find the frequency of a character in a string.
17. Write a program to store Student Information in Structure and Display it.
18. The annual examination is conducted for 10 students for five subjects. Write a program to read the data and determine the following:
    (a) Total marks obtained by each student.
    (b) The highest marks in each subject and the marks of the student who secured it.
    (c) The student who obtained the highest total marks.
19. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
20. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C compiler 30 Nos.

(or)

Server with C compiler supporting 30 terminals or more.

OUTCOMES:

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

1. Solve some simple problems leading to specific applications. (K3)
2. Demonstrate C programming development environment, compiling, debugging, linking and executing a program. (K3)

3. Develop C programs for simple applications making use of basic constructs, arrays and strings. (K4)
4. Develop C programs involving functions and recursion. (K4)
5. Develop C programs involving pointers, and structures. (K6)
6. Design applications using sequential and random access file. (K4)

CO- PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	1	1	-	2	2	-	3	2	3
CO2	3	3	3	3	2	-	1	1	2	2	3	3	2	3
CO3	3	3	3	3	2	1	1	1	2	-	3	-	3	2
CO4	3	3	3	3	2	1	-	1	2	2	3	3	1	2
CO5	3	3	3	3	2	1	1	1	2	2	3	3	2	1
CO6	3	3	3	3	2	1	1	1	2	2	3	3	3	2

SEMESTER - I

20TPHS101 SDG NO. 4&5	SKILL ENHANCEMENT	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To enrich social network ethics
- To develop and enhance browsing culture
- To understand the concepts of networking
- To promote self professionalism
- To acquire knowledge about various digital identification procedures

UNIT I SOCIAL NETWORK ETIQUETTES **6**

Introduction to social network – Social Networking Etiquettes - Pros and Cons - Usage of Facebook, Instagram, WhatsApp , Telegram, Youtube, Evolution of Android and IOS, Introduction to Linkedin & Benefits. (Practicals – Official Mail id- Linkedin Id Creation, Linkedin Profile Bulilding , Facebook Id and Creation and Modifying the existing FB ID)

UNIT II BROWSING CULTURE **6**

Introduction to browsing – Search Engines-Google - Bing -Yahoo!-AOL -MSN –DuckDuckGo ,browsers, phishing – Cookies - URL – https:// extensions ,

browsing history, Incognito mode- VPN – Pros and Cons – Book mark.

UNIT III NETWORKING **6**

Basics of networking - LAN, MAN, WAN, Introduction to network topologies, Protocols , IP Commands (Command line prompt), Define online complier and editor (Practicals – Find Your System IP,Ping Command, Firewall Fortinet, Basic DOS Commands)

UNIT IV PROFESSIONALISM **6**

Dress Code, Body Language, Appropriate Attire ,Communication Skills, Interview preparation – Introducing yourself - How to greet Superiors, Importance of Eye Contact During conversation.

UNIT V DIGITAL IDENTIFICATION **6**

Introduction to NAD - Importance of Aadhar, PAN Card, Passport, Bank Account, Bar Code, QR scan, Payment Gateway (Gpay, Phone Pe, UPI, BHIM, Paytm), Mobile Banking (Practicals - NAD registration Step by Step, Linking bank account with netbanking , Register for payment gateway).

TOTAL : 30 PERIODS

WEB REFERENCES :

Unit I: Social Network Etiquettes:

1. https://sproutsocial.com/glossary/social-media-etiquette/
2. https://www.shrm.org/resourcesandtools/tools-and-samples/hr-qa/pages/socialnetworkingsitespolicy.aspx
3. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.02711/full
4. https://medium.com/@sirajea/11-reasons-why-you-should-use-telegram-instead-of-whatsapp-ab0f80fbfa79
5. https://buffer.com/library/how-to-use-instagram/
6. https://www.webwise.ie/parents/what-is-youtube/
7. https://www.androidauthority.com/history-android-os-name-789433/
8. https://www.mindtools.com/pages/article/linkedin.htm

Unit II: Browsing Culture:

1. https://sites.google.com/site/bethanycollegeofteacheredn/unit--ict-connecting-with-world/national-policy-on-information-and-communication-technology-ict/accessing-the-web-introduction-to-the-browser-browsing-web
2. https://www.wordstream.com/articles/internet-search-engines-history

3. https://www.malwarebytes.com/phishing/
4. https://www.adpushup.com/blog/types-of-cookies/
5. https://www.eff.org/https-everywhere
6. https://www.sciencedirect.com/topics/computer-science/browsing-history\
7. https://www.vpnmentor.com/blog/pros-cons-vpn/
8. https://www.tech-wonders.com/2016/10/use-hush-private-bookmarking-extension-chrome.html

Unit III:Networking

1. https://www.guru99.com/types-of-computer-network.html
2. https://www.studytonight.com/computer-networks/network-topology-types
3. https://www.cloudflare.com/learning/network-layer/what-is-a-protocol/
4. https://www.howtogeek.com/168896/10-useful-windows-commands-you-should-know/
5. https://paiza.io/en

Unit IV : Professionalism

1. https://career.vt.edu/develop/professionalism.html
2. https://englishlabs.in/importance-dress-code/
3. https://www.proschoolonline.com/blog/importance-of-body-language-in-day-to-day-life
4. https://www.thespruce.com/etiquette-of-proper-attire-1216800
5. https://shirleytaylor.com/why-are-communication-skills-important/
6. https://www.triad-eng.com/interview-tips-for-engineers/
7. https://www.indeed.co.in/career-advice/interviewing/interview-question-tell-me-about-yourself
8. https://toggl.com/track/business-etiquette-rules/

Unit V: Digital Identification

1. https://nad.ndml.in/nad-presentation.html
2. https://www.turtlemint.com/aadhaar-card-benefits/
3. https://www.bankbazaar.com/pan-card/uses-of-pan-card.html
4. https://www.passportindex.org/passport.php
5. https://consumer.westchestergov.com/financial-education/money-

management/benefits-of-a-bank-account
6. https://en.wikipedia.org/wiki/QR_code
7. https://www.investopedia.com/terms/p/payment-gateway.asp
8. https://www.paisabazaar.com/banking/mobile-banking/

OUTCOMES:

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

1. Learn and apply social network ethics. (K3)
2. Understand the browsing culture. (K2)
3. Analyze the networking concepts . (K4)
4. Develop self professionalism. (K3)
5. Gain hands-on experience in various digital identification procedures. (K2)
6. Analyse and apply the different digital payment gateway methods. (K4)

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	3	2	-	3	2	3	-	2
CO2	-	-	-	-	3	2	-	3	2	3	-	2
CO3	-	-	-	-	3	2	-	-	1	3	-	2
CO4	-	-	-	-	3	2	-	3	3	3	-	2
CO5	-	-	-	-	3	2	-	-	2	3	-	2
CO6	-	-	-	-	3	2	-	-	2	3	-	2

SEMESTER - I

20HSMG101 SDG NO. 4&5	PERSONAL VALUES	L	T	P	C
		2	0	0	0

OBJECTIVES:

- Values through Practical activities

UNIT I SELF CONCEPT **6**

Understanding self Concept – Identify Yourself – Who am I – an individual, engineer, citizen – Attitude – Measuring Behaviour – Change of Behaviour – Personality – Characteristics in personal, professional life.

UNIT II INDIVIDUAL VALUES **6**

Personal Values – Attributes –Courage – Creativity, Honesty, Perfection, Simplicity, Responsibility – Measuring personal values

UNIT III MORAL VALUES **6**

Moral – Understanding right and wrong – Positive thoughts – Respect to others – Doing good to society.

UNIT IV PHYSICAL AND MENTAL WELL-BEING **6**

Health – Physical fitness –Mental vigour – Diet management – Yoga – Meditation – Peaceful life – Happiness in life

UNIT V DECISION MAKING **6**

Goal Setting – Decision making skill – Overcome of Barriers – Success – Mental strength and weakness

TOTAL: 30 PERIODS

Note:

Each topic in all the above units will be supplemented by practice exercises and classroom activities and projects.

REFERENCE BOOKS:

1. Barun K. Mitra, "Personality Development and Soft Skills", Oxford University Press, 2016.
2. B.N.Ghosh, "Managing Soft Skills for Personality Development" McGraw Hill India, 2012.

OUTCOMES:

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

1. Become an individual in knowing the self. (K4)
2. Acquire and express Personal Values, Spiritual values and fitness. (K4)
3. Practice simple physical exercise and breathing techniques. (K2)
4. Practice Yoga asana which will enhance the quality of life. (K1)
5. Practice Meditation and get benefitted. (K1)
6. Understanding moral values and need of physical fitness. (K2)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	3	3	1	1	1
CO2	-	-	-	-	-	2	2	3	3	1	1	1
CO3	-	-	-	-	-	2	2	3	3	1	1	1
CO4	-	-	-	-	-	2	2	3	3	1	1	1
CO5	-	-	-	-	-	2	2	3	3	1	1	1
CO6	-	-	-	-	-	2	2	3	3	1	1	1

SEMESTER - II

20BSMA204 SDG NO. 4	DISCRETE STRUCTURES	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To learn the basic concepts of Relations and Functions
- To learn the concepts of Mathematical induction, Permutation and Combination
- To understand the concepts of Logic, Rules of inference and Quantifiers
- To impart the knowledge on Groups, Normal subgroups, Rings and Fields
- To develop Graph Algorithms by using the concepts of Graphs and Trees

UNIT I RELATION AND FUNCTION 12

Binary Relation, Partial Ordering Relation, Equivalence Relation – Sum and Product of functions – Bijective functions – Inverse and composite functions.

UNIT II COMBINATORICS 12

The Principles of Mathematical Induction-The Well-Ordering Principle – Recursive definition – Basic counting techniques – Inclusion and exclusion , Pigeonhole principle – Permutation – Combination.

UNIT III LOGICS AND PROOFS 12

Basic Connectives – Truth Tables – Logical Equivalence: The Laws of Logic, Logical Implication – Rules of Inference – The use of Quantifiers – Proof Techniques: Some Terminology – Proof Methods and Strategies – Forward Proof – Proof by Contradiction – Proof by Contraposition.

UNIT IV ALGEBRAIC STRUCTURES 12

Algebraic Structures with One Binary Operation – Semi Groups, Monoids, Groups, Permutation Groups – Subgroups – Normal subgroups – Algebraic Structures with two Binary Operations - Definition and Examples of Rings and Fields – Boolean Algebra – Identities of Boolean Algebra.

UNIT V GRAPHS AND TREES 12

Graphs and their properties – Degree, Connectivity, Path, Cycle – Sub Graph – Isomorphism – Eulerian and Hamiltonian Walks –Rooted Trees, Trees and Sorting.

TOTAL: 60 PERIODS

TEXTBOOKS:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications: with Combinatorics and Graph Theory", 7th Edition, Tata McGraw –Hill Education Pvt. Ltd., 2015.
2. J.P. Tremblay and R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science", Tata Mc Graw Hill Education (India) Edition 1997.
3. Narsingh Deo, "Graph theory with applications to Engineering and Computer Science", Prentice Hall Inc., Englewood Cliffs,N.J., 1974.

REFERENCES:

1. Susanna S. Epp, "Discrete Mathematics with Applications", 4th edition, Brooks/Cole, Cengage Learning, 2010.
2. Norman L. Biggs, "Discrete Mathematics", 2nd Edition, Oxford University Press, 2002.
3. Seymour Lipschutz, MarcLipson, "Discrete Mathematics, Schaum's Outlines Series", 3rd edition, McGraw-Hill Education, 2009.
4. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics: A Computer Oriented Approach", 4th Edition, Tata McGraw–Hill Education Pvt. Ltd, 2012.

WEB REFERENCES :

1. https://web.stanford.edu/class/cs103x/cs103x-notes.pdf
2. https://www.cs.cornell.edu/~rafael/discmath.pdf
3. http://home.iitk.ac.in/~arlal/book/mth202.pdf

ONLINE RESOURCES:

1 https://www.youtube.com/watch?v=h_9WjWENWV8&list=PL3o9D4Dl2FJ9q0_gtFXPh_H4POI5dK0yG

2 https://www.youtube.com/watch?v=xlUFkMKSB3Y&list=PL0862D1A947252D203.

3 https://www.youtube.com/watch?v=4LlTmsfDS4Y&list=PLEAYkSg4uSQ2Wfc_l4QEZUSRdx2ZcFziO&index=13

4 https://www.youtube.com/watch?v=jBsEKyx6Rj0&list=PLwdnzlV3ogoVxVxCTlI45pDVM1aoYoMHf

5. https://www.youtube.com/watch?v=rdXw7Ps9vxc&list=PLHXZ9OQGMqxersk8fUxiUMSIx0DBqsKZS

OUTCOMES:

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

1. Check whether the relation is Binary, Partial Order or equivalence and a function is injective, subjective or bijective, compute inverse and composite of functions (K3)
2. Solve problems on permutations and combinations using the Counting principle and Pigeon hole Principle(K3)
3. Construct mathematical arguments and test the validity of statements using the rules of logic, rules of inference, quantifiers, proof strategies and mathematical induction. (K3)
4. Identify a set with the given binary relation as a group, normal group, ring, fields and Boolean algebra. (K3)
5. Identify Graph isomorphism, Eulerian and Hamiltonian walks and sorting in trees(K3)
6. Explain the properties of functions, relations and graph(K2)

CO- PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	-	-	-	-	-	-	-	1
CO2	3	3	1	2	-	-	-	-	-	-	-	1
CO3	3	3	1	2	-	-	-	-	-	-	-	1
CO4	3	3	1	2	-	-	-	-	-	-	-	1
CO5	3	3	1	2	-	-	-	-	-	-	-	1
CO6	3	3	1	2	-	-	-	-	-	-	-	1

SEMESTER - II

20HSEN201 SDG NO. 4	TECHNICAL ENGLISH - II	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To strengthen the listening skills for comprehending and critically analyzing passages
- To enhance students' ability with multiple strategies and skills for making technical presentations
- To participate in group discussions for developing group attitude
- To develop skills for preparing effective job application
- To write effective technical reports

UNIT I LANGUAGE DEVELOPMENT 9

Listening – Listening conversations involving two participants – multiple participants – **Speaking** – conversation methods in real life occurrences using expressions of different emotions and imperative usages – **Reading** passages and short stories - **Writing** – preparation of checklist – extended definition – **Language Development** – tenses - subject - verb agreement

UNIT II VOCABULARY BUILDING 9

Listening – listening formal and informal conversation and participative exercises – **Speaking** - creating greetings/wishes/excuses and thanks – **Reading** – articles/novels-**Writing** summary of articles and concise writing identifying new words – homonyms, homophones, homographs – one-word substitutions – easily confused words - creating SMS and using emoticons - sharing information in social media. **Language Development** - reported speeches – regular and irregular verbs - idioms & phrases

UNIT III WRITING TECHNICAL REPORTS 9

Listening – listening conversation – effective use of words and their sound aspects, stress, intonation & pronunciation – **Speaking** - practicing telephonic conversations – observing and responding. **Reading** – regular columns of newspapers/magazines - **Writing** – reports – feasibility, accident, survey and progress - preparation of agenda and minutes – **Language Development** - using connectives – discourse markers

UNIT IV TECHNICAL WRITING 9

Listening – Model debates & documentaries - **Speaking** – expressing agreement/disagreement, assertiveness in expressing opinions – **Reading** biographies/autobiographies – **Writing** – note-making – formal letters – inviting guests – acceptance/declining letters - **Language Development** – degrees of comparison - numerical adjectives – embedded sentences

UNIT V GROUP DISCUSSION AND JOB APPLICATION 9

Listening – Listening - classroom lectures – recommending suggestions & solutions – **Speaking** – participating in group discussion – learning GD strategies – **Reading** – journal articles - Writing – Job application – cover letter - résumé preparation – **Language Development** – purpose statement – editing – verbal analogies.

TOTAL: 45 PERIODS

TEXT BOOKS :

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad 2016.

2. Ashraf Rizvi. M, Effective Technical Communication. 2nd ed. McGraw Hill, New Delhi, 2018.

REFERENCES

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. Routledge, New York,2011.
2. Raman, Meenakshi and Sharma, Sangeetha. Technical Communication Principles and Practice. Oxford University Press, New Delhi, 2014.
3. Muralikrishnan& Mishra Sunitha, Communication skills for Engineers 2nd ed. Pearson, Tamilnadu, India 2011. P. Kiranmai and Rajeevan, Geetha. Basic Communication Skills, Foundation Books, New Delhi, 2013.
4. Suresh Kumar, E. Engineering English. Orient Blackswan, Hyderabad, 2015
5. Richards, Jack C. Interchange Students' Book – 2. Cambridge University Press, New Delhi, 2015.

WEB REFERENCES :

1. https://swayam.gov.in/nd1_noc20_hs21/preview
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/109106122/lec1.pdf
3. https://freevideolectures.com/course/3250/introduction-to-film-studies/10

ONLINE RESOURCES

1. https://www.ef.com/wwen/english-resources/
2. https://www.smilesforlearning.org/gclid=EAIaIQobChMI49DF9bnd6AIVSY6PCh1d_gV9EAAYASAAEgIBPvD_BwE.

OUTCOMES:

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

1. Acquire the ability to speak effectively in real life situations (K1)
2. Adapt group behaviour and execute the role as a contributing team member (K1)
3. Employ active and passive vocabulary in oral and written communication (K2)
4. Share opinions and suggestions effectively in conversations, debates and discussions (K2)
5. Prepare winning job applications (K3)
6. Write technical reports convincingly (K3)

CO - PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	2
CO2	-	2	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	1	-	-	2	-	-	3	-	-
CO4	-	-	-	-	-	2	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	2
CO6	-	-	-	-	-	-	-	-	-	3	-	2

SEMESTER - II

20BSPH203 SDG NO. 4	PHYSICS FOR INFORMATION SCIENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the essential principles of physics of conducting materials, superconducting and optical properties of materials
- To educate the basic principles of semiconductor device and electron transport properties
- To become proficient in magnetic materials
- To acquire the basic working of nanoelectronic devices

UNIT I CONDUCTING MATERIALS **9**

Classical free electron theory - Expression for electrical conductivity - Thermal conductivity expression - Wiedemann-Franz law - Success and failures - Electrons in metals - Motion of a particle in a three dimensional box (Quantum Mechanical Approach) - degenerate states - Fermi- Dirac statistics - Density of energy states - Electron in periodic potential - Energy bands in solids - Tight binding approximation - Electron effective mass - Concept of hole.

UNIT II SEMICONDUCTOR MATERIALS **9**

Intrinsic Semiconductors - Direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors - extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors - Variation of carrier concentration with temperature - Variation of Fermi level with temperature and impurity concentration - Carrier transport in Semiconductor: random

motion, drift, mobility and diffusion - Hall effect and devices - Ohmic contacts - Schottky diode.

UNIT III MAGNETIC PROPERTIES OF MATERIALS 9

Magnetic dipole moment - atomic magnetic moments - magnetic permeability and susceptibility - Magnetic material classification: diamagnetism - paramagnetism - ferromagnetism - antiferromagnetism - ferrimagnetism - Ferromagnetism: origin and exchange interaction - Domain Theory - M versus H behaviour - Hard and soft magnetic materials - applications - Magnetic principle in computer data storage - Magnetic hard disc - GMR sensor.

UNIT IV SUPERCONDUCTING & OPTICAL PROPERTIES OF MATERIALS 9

Super conductivity - Type-I and Type-II superconductors - Properties and applications - Classification of optical materials - Carrier generation and recombination processes - Photo current in a P-N diode - Solar cell - LED - Organic LED - Optical data storage techniques and devices.

UNIT V NANO DEVICES 9

Introduction - Size dependence of Fermi energy - Quantum confinement - Quantum structures - Density of states in quantum well, quantum wire and quantum dot structure - Band gap of nanomaterials - Tunneling: single electron phenomena and single electron transistor - Quantum dot laser - Carbon nanotubes: Properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley 2012.
2. Kasap, S.O., "Principles of Electronic Materials and Devices", McGraw-HillEducation, 2017.
3. Kittel, C., "Introduction to Solid State Physics", Wiley, 2018.
4. S.O.Pillai, "Solid State Physics, New Academic Science", 2017.
5. D.K.Bhattacharya & PoonamTandon., "Physics for Information Science and Electronics Engineering", Oxford Higher Education",2017.

REFERENCES:

1. Garcia, N. & Damask, A., "Physics for Computer Science Students", Springer-Verlag, 2012.
2. Hanson, G.W., "Fundamentals of Nanoelectronics", Pearson Education, 2009.
3. Rogers, B., Adams, J. &Pennathur, S., "Nanotechnology: Understanding Small Systems", CRC Press, 2014.

OUTCOMES:

At the end of the course, the students should able to

1. Understand the basic concepts of various free electron theory and to determine the electrical properties of solids. (K3)
2. Apply the classical and quantum free electron theory to determine the properties of conductors (K3)
3. To analyze the properties of semiconductors and its applications (K4)
4. To analyze the mechanisms involved in the magnetic and optical materials using the quantum concepts (K4)
5. To gain the knowledge on superconducting materials and nanostructures and its applications. (K2)
6. To demonstrate the working principles of micro and nanoelectronic devices. (K3)

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-
CO4	3	3	2	-	1	-	-	-	-	-	-	1
CO5	3	3	3	-	2	1	-	-	-	-	-	2
CO6	3	3	3	-	3	1	1	-	-	-	-	3

SEMESTER - II

20BSCY201 SDG NO. 4,17	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the nature and facts about environment
- To finding and implementing scientific, technological, economic and political solutions to environmental problems
- To study the interrelationship between living organism and environment
- To provide the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value

- To study the dynamic processes and illustrate the features of the earth's interior and surface
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 10

Definition, scope and importance of environment – need for public awareness – Ecosystem: concept of an ecosystem – structure and functions of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – food chains, food webs and ecological pyramids – ecological succession. Introduction to biodiversity definition: genetic, species and ecosystem diversity – values of biodiversity. Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity – man-wildlife conflicts – endangered and endemic species of India. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 9

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies. Disaster management: floods, earthquake, cyclone and landslides – nuclear accidents and holocaust – case studies. Field study of local polluted site – Urban / Rural / Industrial /Agricultural.

UNIT III NATURAL RESOURCES 9

Forest resources: Use and over – exploitation, deforestation, case studies – Water resources: Use and over- utilization of surface and ground water – dams-benefits and problems, conflicts over water – Mineral resources: Environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, case studies – Energy resources: Growing energy needs, use of alternate energy sources - renewable and non renewable energy sources – Land resources: land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From unsustainable to sustainable development –Sustainable Development Goals – Water conservation: rain water harvesting, watershed management – Climate change: global warming, chemical and photochemical reactions in the atmosphere – acid rain, ozone layer depletion – environmental ethics: Issues and possible solutions – 12 Principles of green chemistry – Environmental Legislation & Laws: Environment (Protection) Act – 1986 Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labelling of environmentally friendly products (Ecomark) – Issues involved in enforcement of environmental legislation- central and state pollution control boards, role of non-governmental organization – Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 8

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – Environmental Impact Assessment(EIA) - role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES :

1. Dharmendra S. Sengar, “Environmental law”, Prentice hall of India PVT LTD,New Delhi, 2007.
2. Erach Bharucha, “Textbook of Environmental Studies”, Universities Press(I) PVT, LTD, Hydrabad, 2015.
3. G. Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India PVT, LTD, Delhi, 2014.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

OUTCOMES

Upon successful completion of this course, student should be able to

1. Understand the relationship between the environment and human activities to maintain the ecological balance. (K1)

2. Identify societal issues and implement suitable technological solutions to eradicate. (K3)
3. Acquire skills for scientific problem solving related to environmental pollution and Disaster Management. (K3)
4. Disseminate the need for the natural resources and its application to meet the modern requirements. (K2)
5. Aware of environmental issues and Protection Acts to achieve the Sustainable Development Goals. (K2)
6. Recognize the need for population control measures and the environmental based value.education concepts for attaining an eco-friendly environment. (K2)

CO - PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	-	-	1	2	-	1	1	-	2
CO2	2	2	2	-	2	2	3	1	2	2	-	2
CO3	1	1	1	1	-	1	1	-	1	2	-	1
CO4	2	2	2	2	1	1	1	-	1	1	1	1
CO5	2	2	1	-	-	1	1	-	-	-	1	-
CO6	1	1	1	1	1	1	1	1	1	1	1	1

SEMESTER - II

20ESIT202 SDG NO. 4&9	PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop simple Python programs with conditionals and loops
- To define Python functions and to implement lists, tuples, dictionaries and sets
- To perform file operations and understand OO concepts in Python
- To understand NumPy, Pandas and Matplotlib

UNIT I BASICS OF PYTHON PROGRAMMING **9**

Introduction to Python – Literals – Variables and Identifiers – Data Types – Input Operation – Comments – Reserved words – Indentation – Operators and Expressions - Conditionals: Boolean values and operators - conditional if -

alternative if - chained conditional - Iteration - Illustrative programs: Evaluation of expressions - String Operations - Circulate the values of n variables - Square root (Newton's method) - GCD - Sum an Array of Numbers.

UNIT II STRING, LISTS, TUPLES, DICTIONARIES, SETS **9**

Strings: String slices - Immutability - String functions and methods - String module - Lists: List operations - List slices - List methods - List loop - Mutability - Aliasing - Cloning lists - List parameters - Tuples: Tuple assignment - Tuple as return value.

Dictionaries: Operations and Methods - Advanced list processing - List comprehension - Sets: Creating Sets – Operations and methods – Set comprehension - Illustrative programs: Linear search - Binary search - Selection sort - Insertion sort - Merge sort.

UNIT III FUNCTIONS, MODULES, PACKAGES **9**

Functions - definition and use - Flow of execution - Parameters and arguments - Fruitful functions: Return values - Parameters - Local and global scope - Function composition - Recursion - Modules – from import statement – Name of Module – Making your own modules - Packages - Packages in Python – Standard Library Modules – Globals(), Locals() and Reload(); Illustrative programs: Fibonacci series using functions - Arithmetic operations using module - Area of different shapes using packages.

UNIT IV FILES, EXCEPTIONS, CLASSES AND OBJECTS **9**

Files and exception: Text files - Reading and writing files - Format operator - Command line arguments - Errors and exceptions - Handling exceptions - Classes and Objects: Defining classes - Creating Objects – Data abstraction – Class constructor – Class variables and Object variables – Public and Private data members – Private Methods; Illustrative programs: Word count - Copy file - Creating user defined exception - Creating student class and object.

UNIT V NUMPY, PANDAS, MATPLOTLIB **9**

Introduction - Basics of NumPy - N-dimensional Array in NumPy - Methods and Properties - Basics of SciPy - Broadcasting in NumPy Array Operations - Array Indexing in NumPy, Pandas - Introduction - Series - DataFrame - Matplotlib - Basics - Figures and Axes - Method subplot() - Axis container Illustrative Programs: Multiplying a Matrix by a Vector, Solving Linear System of Equations - Using Pandas to Open CSV files - Creating a Single plot.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press 2018.

2. Anurag Gupta, G.P. Biswas, "Python Programming: Problem Solving, Packages and Libraries", McGrawHill, 2020.

REFERENCES:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2", Network Theory Ltd., 2011.
3. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
4. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
5. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
6. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
7. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2013.
8. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

WEB REFERENCES:

1. http://greenteapress.com/wp/think-python/
2. www.docs.python.org
3. https://nptel.ac.in/courses/106/106/106106182/

OUTCOMES:

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

1. Define the syntax and semantics of python programming language and Understand control flow statements, strings and functions. [K1]
2. Determine the methods to create and manipulate python programs by utilizing the data structures like lists, dictionaries, tuples and sets. [K3]
3. Annotate the concepts of functions, modules and packages in python. [K2]
4. Understand the concepts of files, exception handling and also apply the object oriented programming concept by creating classes and objects. [K6]
5. Illustrate and use some of the libraries available with python.[K4]
6. Applying the problem solving concepts to various applications using python.[K6]

CO- PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	1	1	0	0	1	0	1	2	2
CO2	3	3	3	3	3	1	0	0	0	0	0	1	2	2
CO3	3	3	3	3	3	2	1	0	0	0	0	1	2	2
CO4	3	3	3	3	3	2	1	0	0	0	0	1	2	2
CO5	3	3	3	3	3	2	2	1	0	2	0	2	3	3
CO6	3	3	3	3	3	3	3	2	3	2	3	2	3	3

SEMESTER - II

20ESIT203 SDG NO. 4, 9	DIGITAL PRINCIPLES AND SYSTEM DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To analyze and design combinational circuits
- To analyze and design synchronous and asynchronous sequential circuits
- To understand Programmable Logic Devices
- To write HDL code for combinational and sequential circuits

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES **9**

Number Systems – Arithmetic Operations – Binary Codes- Boolean Algebra and Logic Gates – Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Simplification of Boolean Functions using Karnaugh Map – Logic Gates – NAND and NOR Implementations.

UNIT II COMBINATIONAL LOGIC **9**

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**

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**

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**

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

TOTAL: 45 PERIODS

TEXT BOOKS:

1. M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog", 6th Edition, Pearson Education, 2017.

REFERENCES:

1. G. K. Kharate, "Digital Electronics", Oxford University Press, 2010
2. John F. Wakerly, "Digital Design Principles and Practices", Fifth Edition, Pearson Education, 2017.
3. Charles H. Roth Jr, Larry L. Kinney, "Fundamentals of Logic Design", Sixth Edition, CENGAGE Learning, 2013
4. Donald D. Givone, "Digital Principles and Design", Tata Mc Graw Hill, 2003.

ONLINE RESOURCES:

1. https://ocw.mit.edu/courses/online-textbooks/
2. https://nptel.ac.in/courses/117105080/

OUTCOMES:

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

1. Understanding Boolean algebra, number systems and simplify Boolean functions using Kmap. (K2)
2. Analyze the Combinational and sequential Circuits. (K2)
3. Design Combinational Circuits and Sequential circuits (K5)
4. Implement designs using Programmable Logic Devices. (K3)
5. Apply HDL code for combinational and Sequential Circuits. (K3)
6. Design and troubleshoot logic circuits. (K4)

CO – PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	2	-	-	-	-	-	-	-	-	3	1	-	-
CO3	-	2	3	-	-	-	-	-	-	-	3	1	-	-
CO4	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO5	-	-	-	-	1	-	-	-	-	-	-	2	-	-
CO6	-	-	-	-	-	-	-	-	-	-	3	-	-	-

SEMESTER - II

20ESGE201 SDG NO. 4,9,12	ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	3	1

OBJECTIVES:

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

ELECTRICAL ENGINEERING PRACTICE:

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

ELECTRONICS ENGINEERING PRACTICE:

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

CIVIL ENGINEERING PRACTICE:

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings, safety aspects.

Plumbing Works:

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

Carpentry using Power Tools only:

1. Study of the joints in roofs, doors, windows and furniture.
2. Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

MECHANICAL ENGINEERING PRACTICE:

Welding:

1. Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
2. Gas welding practice.

Basic Machining:

1. Simple Turning and Taper turning.
2. Drilling Practice.

Sheet Metal Work:

1. Forming & Bending.
2. Model making – Trays and funnels.
3. Different type of joints.

Machine assembly practice:

1. Study of centrifugal pump.
2. Study of air conditioner.

Demonstration on:

1. Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
2. Foundry operations like mould preparation for gear and step cone pulley.
3. Fitting – Exercises – Preparation of square fitting and V – fitting models.

Total : 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

1. Electrical

1	Assorted electrical components for house wiring	15 Sets
2	Electrical measuring instruments	10 Sets
3	Study purpose items: Iron box, fan and regulator, emergency lamp	1 Each
4	Megger (250V/500V)	1 No
5	Power Tools: Range Finder Digital Live-wire detector	 2 Nos 2 Nos

2. Electronics

1	Soldering guns	10 Nos
2	Assorted electronic components for making circuits	50 Nos
3	Small PCBs	10 Nos
4	Multimeters	10 Nos

3. Civil

1	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets
2	Carpentry vice (fitted to work bench)	15 Nos
3	Standard woodworking tools	15 Sets
4	Models of industrial trusses, door joints, furniture joints	5 each
5	Power Tools: Rotary Hammer Demolition Hammer Circular Saw Planer Hand Drilling Machine Jigsaw	 2 Nos 2 Nos 2 Nos 2 Nos 2 Nos 2 Nos

4. Mechanical

1	Arc welding transformer with cables and holders	5 Nos
2	Welding booth with exhaust facility	5 Nos
3	Welding accessories like welding shield, chipping hammer, wire brush, etc	5 Sets
4	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos
5	Centre lathe	2 Nos
6	Hearth furnace, anvil and smithy tools	2 Sets
7	Moulding table, foundry tools	2 Sets
8	Power Tool: Angle Grinder	2 Nos
9	Study-purpose items: centrifugal pump, air-conditioner	1 each

OUTCOMES:

Upon completion of the course, the students should be able to

1. Elaborate on the components, gates, soldering practices. Calculate electrical parameters such as voltage, current, resistance and power. (K1)
2. Design and implement Rectifier and Timer circuits (K2)
3. Measure the electrical energy by single phase and three phase energy meters. (K2)
4. Prepare the carpentry and plumbing joints. (K2)
5. Perform different types of welding joints and sheet metal works (K2)
6. Perform different machining operations in lathe and drilling. (K2)

CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2	1	-	-	1	1	1	1
CO2	3	2	1	1	2	1	-	-	1	1	1	1
CO3	2	2	1	1	1	1	-	-	1	1	1	1
CO4	1	1	1	-	-	2	-	-	1	1	1	2
CO5	2	1	1	-	-	1	1	1	1	1	1	2
CO6	2	1	1	-	-	1	-	1	1	1	1	2

SEMESTER - II

20ESPL201 SDG NO. 4	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- Develop Python programs with conditionals, loops and functions
- Represent compound data using Python lists, tuples, dictionaries
- Read and write data from/to files in Python
- Implement NumPy, Pandas, Matplotlib libraries

LIST OF EXPERIMENTS :

1 Compute the GCD of two numbers
2 Find the maximum and minimum of a list of numbers
3 Linear search and Binary search
4 Selection sort, Insertion sort
5 Merge sort, Quick Sort
6 First n prime numbers
7 Multiply matrices
8 Programs that take command line arguments (word count)
9 Find the most frequent words in a text read from a file
10 Exception Handling – License Process
11 Classes and Objects – Student class
12 Solving Linear System of Equations
13 Using Pandas to Open csv files
14 Creating a Single plot
15 Creating Scatter plot, Histogram

TOTAL: 45 PERIODS

LAB REQUIREMENTS

Python 3

OUTCOMES

On completion of the laboratory course, the student should be able to

1. Implement simple programs for describing the syntax, semantics and control flow statements. [K3]
2. Examine the core data structures like String, lists, dictionaries, tuples and sets in Python to store, process and sort the data. [K2]
3. Articulate the concepts of functions, modules and packages in Python. [K2]

4. Illustrate the applications of python libraries. [K3]
5. Create files and perform read and write operations in it. [K3]
6. Handle exceptions and create classes and objects for any real time applications. [K3]

CO- PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	1	2	1	2	-	-	-	1	-	3	3	-	1
CO2	1	2	3	3	3	2	1	1	1	1	1	3	1	2
CO3	-	1	3	3	2	1	-	-	-	-	1	3	-	1
CO4	1	2	3	3	2	-	-	-	-	-	1	3	1	2
CO5	-	-	3	3	2	-	-	1	-	-	2	3	-	-
CO6	-	-	3	3	2	-	-	1	-	-	2	3	-	-

SEMESTER - II

20ESPL202 SDG NO. 4 & 9	DIGITAL LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To design and implement the various combinational circuits
- To design and implement combinational circuits using MSI devices
- To design and implement sequential circuits
- To understand and code with HDL programming

LIST OF EXPERIMENTS

1. Verification of Boolean Theorems using basic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters
3. Design and implement Half/Full Adder and Subtractor
4. Design and implement combinational circuits using MSI devices:
   a) 4 bit binary adder/subractor
   b) Parity generator/checker
   c) Magnitude comparator
5. Application using multiplexers
6. Design and implement shift-registers

7. Design and implement synchronous counters
8. Design and implement asynchronous counter
9. Coding combinational circuits using HDL
10. Coding sequential circuits using HDL
11. Design and implementation of a simple digital system (Mini Project)

LAB REQUIREMENTS:

HARDWARE:

DIGITAL TRAINER KITS

DIGITAL IC's required for the experiments in sufficient numbers

SOFTWARE:

HDL, Verilog simulator

TOTAL: 45 PERIODS

OUTCOMES

On completion of the laboratory course, the student should be able to

1. Implement simplified combinational circuits using basic logic gates. (K6)
2. Implement combinational circuits using MSI devices. (K6)
3. Implement sequential circuits like registers and counters.(K6)
4. Simulate combinational and sequential circuits using HDL.(K4)
5. Implement designs using Programmable Logic Devices. (K6)
6. Design and implementation of a simple digital system.(K6)

CO- PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	2	2	1	1	-	2	2	-	2	1	1
CO2	3	3	3	2	3	2	1	1	2	2	2	3	1	1
CO3	2	3	3	3	3	2	2	1	2	2	2	3	1	1
CO4	3	3	3	3	3	2	2	1	3	3	3	3	1	1
CO5	2	3	3	2	2	-	-	2	-	2	2	2	1	1
CO6	2	3	3	2	2	1	-	-	2	2	3	2	1	1

SEMESTER - II

20TPHS201 SDG NO. 4&5	SKILL ENHANCEMENT	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To understand the nuances in resume building
- To explore various virtual meeting tools
- To gain knowledge about online certification courses
- To develop knowledge in Google Suite products
- To enhance presentation skills

UNIT I RESUME BUILDING **6**

Your Strength, Projects, Internship, Paper Presentation, uploading your coding in github, Introduction to HackerRank, HackerEarth virtual online assessment (Auto Proctored) (Practicals - Construct a resume, Register for a online Mock Assessment / Contest)

UNIT II VIRTUAL MEETINGS **6**

Basic Etiquette of virtual meeting – Introduction to Skype - Zoom - Webex - Google Meet - Gotowebinar - Jio meet – Screen Share - Jamboard - Feedback polling - Chatbox

(Practicals - Accept and Register for a mock class to attend - How to host a meeting).

UNIT III ONLINE LEARNING **6**

Online Certification - Coursera – Udemy – Edx – Cisco – Online Practice Platforms - SkillRack – Myslate - FACEprep - BYTS - aptimithra - Contest Registrations - TCS Campus Commune - HackwithInfy, InfyTQ - Virtusa NurualHack - Mindtree Osmosis – Online assessment - AMCAT-PGPA.

(Practicals - Campus Commune Registration , Coursera registration - Mock Registration (KAAR Technologies as sample).

UNIT IV GOOGLE SUITE **8**

Define google suite - Benefits of google suite - Google Search - Sheet - Docs - Forms - Calender - Drive - Slide - Translate - Duo - Earch - Maps - Hangouts- Sites - Books - Blogger

(Practicals – Create google sheets and share - Create google Forms and share, Create Google Slide and share , Google drive creation and share (Knowledge of Rights), Create poll and share.

UNIT V PRESENTATION SKILLS **4**

Email Writing – Group Discussion - Power Point Presentation (Practicals- Create a self SWOT Analysis report. A PowerPoint Slide Preparation)

TOTAL : 30 PERIODS

WEB REFERENCES :

Unit I: Resume Building:

1. https://zety.com/blog/resume-tips
2. https://resumegenius.com/blog/resume-help/how-to-write-a-resume
3. https://www.hackerearth.com/recruit/
4. https://www.hackerrank.com/about-us

Unit – II:Virtual Meetings

1. https://www.claphamschool.org/our-community/blog/online-learning-etiquette-guide-14-principles-to-guide-students
2. https://online.hbs.edu/blog/post/virtual-interview-tips?c1=GAW_SE_NW&source=IN_GEN_DSA&cr2=search__-__nw__-__in__-__dsa__-__general&kw=dsa__-__general& cr5=459341920955&cr7=c&gclid=Cj0KCQjw8fr7BRDSARIsAK0Qqr4dRRbboL3kltrwDsr7hm8oIHtN5dfjD3NIFZULuzNwEXxhjpNFQ2caApn5EALw_wcB
3. https://hygger.io/blog/top-10-best-group-meeting-apps-business/
4. https://www.zdnet.com/article/best-video-conferencing-software-and-services-for-business/

Unit – III:Online Learning

1. https://www.coursera.org/browse
2. https://support.udemy.com/hc/en-us/articles/229603868-Certificate-of-Completion
3. https://www.edx.org/course/how-to-learn-online
4. https://www.cisco.com/c/en/us/training-events/training-certifications/certifications.html
5. https://campuscommune.tcs.com/en-in/intro
6. https://www.freshersnow.com/tcs-campus-commune-registration/
7. https://www.infosys.com/careers/hackwithinfy.html
8. https://www.mindtree.com/blog/osmosis-2013-my-experiences
9. https://www.myamcat.com/knowing-amcat
10. https://www.admitkard.com/blog/2020/02/06/amcat/

Unit IV: Google Suite

1. https://www.inmotionhosting.com/blog/what-is-g-suite-and-why-should-i-consider-using-it/

2. https://en.wikipedia.org/wiki/G_Suite
3. https://blog.hubspot.com/marketing/google-suite
4. https://kinsta.com/blog/g-suite/

Unit V: Presentation Skills

1. https://www.mindtools.com/CommSkll/EmailCommunication.htm
2. https://www.grammarly.com/blog/email-writing-tips/
3. https://business.tutsplus.com/articles/how-to-write-a-formal-email--cms-29793
4. https://www.softwaretestinghelp.com/how-to-crack-the-gd/
5. https://www.mbauniverse.com/group-discussion/tips
6. https://slidemodel.com/23-powerpoint-presentation-tips-creating-engaging-interactive-presentations/
7. https://business.tutsplus.com/articles/37-effective-powerpoint-presentation-tips--cms-25421
8 https://blog.prezi.com/9-tips-on-how-to-make-a-presentation-a-success/
9. http://www.garrreynolds.com/preso-tips/design/

OUTCOMES:

On completion of this course, the student should be able to

1. Construct a suitable resume and registration procedure for online mock assessments. (K1)
2. Handle various virtual meeting tools. (K3)
3. Acquire exposure about online certification courses. (K4)
4. Get involved and work in a collaborative manner. (K2)
5. Gain knowledge in various presentation methodologies. (K1)
6. Apply knowledge to practice Google suite features and SWOT analysis. (K3)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	3	2	-	3	2	3	-	2
CO2	-	-	-	-	3	2	-	3	2	3	-	2
CO3	-	-	-	-	3	2	-	-	1	3	-	2
CO4	-	-	-	-	3	2	-	3	3	3	-	2
CO5	-	-	-	-	3	2	-	-	2	3	-	2
CO6	-	-	-	-	3	2	-	-	2	3	-	2

SEMESTER - II

20HSMG201 SDG NO. 4 & 5	INTERPERSONAL VALUES	L	T	P	C
		2	0	0	0

OBJECTIVES:

- Values through Practical activities

UNIT I INTERPERSONAL VALUES **6**

Interpersonal Relationships and Values – Importance and Barriers – Building and maintain relationships – Mutual understanding – Respect to others.

UNIT II EFFECTIVE COMMUNICATION **6**

Communication skills –Importance and Barriers - Impressive formation and management – Public speaking

UNIT III GROUP DYNAMICS **6**

Group formation –Teamwork – Identify others attitude and behaviour – Formation of relationship – Personal and professional.

UNIT IV MUTUAL RELATIONSHIP **6**

Building mutual understanding and cooperation – Enhancing decision making skills – Problem solving skills – Comparative Appraisal – Interpersonal needs.

UNIT V POSITIVE ATTITUDE **6**

Fostering trust and cooperation – Developing and maintain positive attitude – Improving socialization – Development of security and comfort.

TOTAL: 30 PERIODS

Note: Each topic in all the above units will be supplemented by practice exercises and classroom activities and projects.

REFERENCE BOOKS:

1. Barun K. Mitra, "Personality Development and Soft Skills", Oxford University Press, 2016.
2. B.N.Ghosh, "Managing Soft Skills for Personality Development", McGraw Hill India, 2012.

OUTCOMES:

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

1. Develop a healthy relationship & harmony with others. (K1)
2. Practice respecting every human being. (K3)
3. Practice to eradicate negative temperaments. (K3)
4. Acquire Respect, Honesty, Empathy, Forgiveness and Equality. (K4)
5. Manage the cognitive abilities of an Individual. (K5)
6. Understanding the importance of public speaking and teamwork. (K2)

CO – PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	3	3	1	1	1
CO2	-	-	-	-	-	2	2	3	3	1	1	1
CO3	-	-	-	-	-	2	2	3	3	1	1	1
CO4	-	-	-	-	-	2	2	3	3	1	1	1
CO5	-	-	-	-	-	2	2	3	3	1	1	1
CO6	-	-	-	-	-	2	2	3	3	1	1	1

SEMESTER - III

20BSMA304 SDG NO. 4	STATISTICS AND LINEAR ALGEBRA	L	T	P	C
		3	1	0	4

OBJECTIVES:

- The main objective of this course is to provide students with the foundations of statistics and linear algebra mostly used in varied applications in engineering

UNIT I BASIC STATISTICS 12

Measures of Central tendency: Moments, Skewness and Kurtosis - Probability distributions - Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation,

UNIT II TESTING OF HYPOTHESIS 12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means - Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independence) - Goodness of fit.

UNIT III VECTOR SPACES 12

Vector spaces – Subspaces – Linear combinations– Linear independence and linear dependence – Bases and dimensions.

UNIT IV LINEAR TRANSFORMATION AND DIAGONALIZATION 12

Linear transformation - Null spaces and ranges - Dimension theorem - Matrix of a linear transformation - Eigenvalues and eigenvectors - Diagonalizability.

UNIT V INNER PRODUCT SPACES 12

Inner product, norms - Gram Schmidt orthogonalization process - Adjoint of linear operations - Least square approximation.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Michael Baron,"Probability and Statistics for Computer Scientists", second edition, CRC press, USA.
2. Howard Anton,Chris Rorres, "Elementary Linear Algebra",Wiley Publications,11th edition,2014.

REFERENCES:

1. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition,2004.
2. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 8thEdition, Pearson Education, Asia,2007.
3. Kapur J. N., Saxena H.C., "Mathematical Statistics", 18th Edition, S. Chand & Company Ltd., 1997.
4. Friedberg A.H.,Insel A.J. and Spence L., "Linear Algebra", Prentice Hall of India, New Delhi,2014.
5. Strang G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.
6. Kumaresan S., - "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.
7. E. Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley,1999.

WEB REFERENCES:

1. https://people.richland.edu/james/lecture/m113/
2. https://nptel.ac.in/courses/111105041/
3 https://www.imsc.res.in/~svis/Algebra/Sunder-LinearAlg-notes.pdf

ONLINE RESOURCES:

1. https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/
2. https://www.khanacademy.org/math/statistics-probability/significance-tests-one-sample/more-significance-testing-videos/v/hypothesis-testing-and-p-values

OUTCOMES:

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

1. Evaluate the statistical parameters of standard distributions using the concepts of probability. (K3)
2. Apply tests of hypotheses for large and small samples. (K3)
3. Compute correlation coefficient, regression, Chi –square statistic and least square approximation. (K3)
4. Compute basis, dimension, null space, range, matrix of linear transformation (K3)
5. Construct the diagonal form of the linear transformation and find the adjoint of linear operators. (K3)
6. Apply the concept of inner product to compute the orthonormal basis using Gram Schmidt orthogonalization process. (K3)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	-	-	-	-	1
CO2	3	3	2	1	-	-	-	-	-	-	-	1
CO3	3	3	2	1	-	-	-	-	-	-	-	1
CO4	3	3	2	1	-	-	-	-	-	-	-	1
CO5	3	3	2	1	-	-	-	-	-	-	-	1
CO6	3	3	2	1	-	-	-	-	-	-	-	1

SEMESTER - III

20ITPC301 SDG NO. 4	DATA STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the concepts of ADT's
- To learn Linear Data Structures – Lists, Stacks, and Queues
- To understand Sorting, Searching and Hashing Algorithms
- To learn Dynamic Data Structures - Tree and Graph

UNIT I LINEAR DATA STRUCTURES – I 9

Stacks and Queues : Abstract Data Types (ADTs) – Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to Postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue –Dequeue – Applications of Queues.

UNIT II LINEAR DATA STRUCTURES – II 9

Linked List: 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).

UNIT III NON LINEAR DATA STRUCTURES – I 9

Trees : Tree ADT – Tree Traversals - Binary Tree ADT – Expression Trees – Applications of Trees – Binary Search Tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree -Heap – Applications of Heap.

UNIT IV NON LINEAR DATA STRUCTURES – II 9

Graphs : Definition – Representation of Graph – Types of Graph – Breadth First Traversal –Depth First Traversal – Topological Sort – Bi-Connectivity – Cut Vertex – Euler Circuits – Dijkstra‟s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms – Applications of Graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES 9

Searching- Linear Search - Binary Search - Sorting - Bubble Sort - Selection Sort - Insertion Sort - Shell Sort – Radix Sort – Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education Asia, 2002.
2. Reema Thareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2011.

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.
3. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
4. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.

WEB REFERENCES :

1. https://www.programiz.com/dsa
2. http://masterraghu.com/subjects/Datastructures/ebooks/remathareja.pdf

OUTCOMES:

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

1. Implement abstract data types for linear data structures.(K3)
2. Implement abstract data types for non-linear data structure.(K3)
3. Apply the different linear and non-linear data structures to problem solutions.(K3)
4. Implement the various sorting and searching algorithms. (K3)
5. Solve Problem involving Graph, Trees and Heap. (K3)
6. Choose appropriate data structures to solve real world problems efficiently.(K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	1	1	1	0	2	2	3	3	1	1
CO2	2	2	1	2	1	1	1	0	2	2	3	3	1	1
CO3	3	3	2	3	3	1	1	1	2	2	3	3	1	1
CO4	2	2	1	2	3	2	1	0	1	1	2	1	1	2
CO5	2	2	1	2	3	0	0	1	2	1	2	2	1	2
CO6	3	3	3	3	1	0	0	0	1	1	2	1	2	2

SEMESTER - III

20CSPC301 SDG NO. 4 & 9	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		2	1	0	3

OBJECTIVES:

- To understand object oriented programming concepts and principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generic classes
- To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming – Abstraction – Objects and Classes – Encapsulation– Inheritance – Polymorphism– OOP In Java – Characteristics of Java – The Java Environment – Java Source File – Compilation - Fundamental Programming Structures in Java – Defining Classes in Java – Constructors - Methods -Access Specifiers– Static Members – Comments - Data Types – Variables – Operators - Control Flow - Arrays - Packages – Javadoc Comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super Classes– Sub Classes –Protected Members – Constructors in Sub Classes– The Object Class – Abstract Classes and Methods– Final Methods and Classes – Interfaces – Defining an Interface - Implementing Interface - Differences Between Classes and Interfaces - Extending Interfaces – Object Cloning - Inner Classes - Array Lists – Strings.

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions – Exception Hierarchy – Throwing and Catching Exceptions – Built-In Exceptions - Creating Own Exceptions - Stack Trace Elements - Input /

Output Basics – Streams – Byte Streams and Character Streams – Reading and Writing Console – Reading and Writing Files.

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8

Differences between Multi-Threading and Multitasking - Thread Life Cycle - Creating Threads - Synchronizing Threads - Inter-Thread Communication - Daemon Threads - Thread Groups - Java Concurrency Packages - Generic Programming – Generic Classes – Generic Methods – Bounded Types – Restrictions and Limitations.

UNIT V LAMBDAS STREAMS AND REACTIVE PROGRAMMING 9

Lambda Expressions – Library Enhancements to Support Lambdas– No Parameter-Single Parameter-Multiple Parameters– With or Without Return

TEXT BOOKS:

1. Herbert Schildt, "JavaThe Complete Reference", 10th Edition, McGrawHill Education,2017.
2. E.Balagursamy, "Programming with Java 6th Edition, McGrawHill Education, 2019.

REFERENCES:

1. Paul Deitel, HarveyDeitel, "Java SE 8 for Programmers", 3rd Edition, Pearson, 2015.
2. Steven Holzner, "Java 2Blackbook", Dream Tech, Press, 2011.
3. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education,2000.

WEB REFERENCES:

1. https://www.w3schools.com/java/java_oop.asp
2. https://www.edureka.co/blog/object-oriented-programming/

ONLINE RESOURCES:

1. https://www.ntu.edu.sg/home/ehchua/programming/java/J3a_OOPBasics.html
2. https://introcs.cs.princeton.edu/java/lectures/

OUTCOMES:

Upon completion of the course, student should be able to

1. Comprehend Object Oriented Programming Concepts in Java. (K2)

2. Illustrate the purpose of packages, Java documents and Analyze the various types of Inheritance. (K4)
3. Apply the Object Oriented Programming Concepts to develop the reusable Applications. (K3)
4. Illustrate the java applications using Java Exceptions and I/O Streams.(K4)
5. Understand the concept of Multithreading and Generic Classes in Java. (K2)
6. Design and implement Lambda expressions, streams and reactive programming. (K6)

CO- PO,PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	2	-	2	-	-	-	-	-	2	3	2
CO2	3	1	3	2	-	2	-	-	2	-	-	2	3	2
CO3	3	1	3	2	-	2	-	-	-	-	-	2	3	3
CO4	3	1	3	2	-	2	-	-	-	-	-	2	3	2
CO5	3	1	3	2	3	2	-	-	-	-	-	2	3	2
CO6	3	1	3	2	3	2	-	-	1	-	-	2	3	2

SEMESTER - III

20ITPC302 SDG NO. 4	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To address the real time complex engineering problems using innovative approaches with strong core computing skills
- To apply core-analytical knowledge and appropriate techniques and provide solutions to real time challenges of national and global society
- Apply ethical knowledge for professional excellence and leadership for the betterment of the society
- Develop life-long learning skills needed for better employment and entrepreneurship

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction to Software Engineering - Software Process - Perspective and Specialized Process Models – Introduction to Agility - Agile process - Extreme programming - XP Process.

UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

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

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 AND MAINTENANCE 9

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

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & 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.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Seventh Edition, McGraw-Hill International Edition, 2005
2. Ian Sommerville, "Software Engineering", Seventh Edition, Pearson Education Asia, 2007.

REFERENCES:

1. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited, 2009.
2. Pankaj Jalote, "Software Engineering - A Precise Approach", Wiley India, 2010.
3. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.

4. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited,2007.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_cs69/preview
2. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs69
3. https://nptel.ac.in/courses/106/105/106105182/

ONLINE RESOURCES:

1. http://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf
2. https://freevideolectures.com/course/2318/software-engineering
3. https://courses.cs.washington.edu/courses/cse403/01au/lectures/
4. https://cosmolearning.org/courses/introduction-to-software-engineering/video-lectures/
5. https://www.ece.rutgers.edu/~marsic/books/SE/instructor/slides/

OUTCOMES:

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

1. Identify the key activities in Managing a Software Project and Compare Different Process Models. (K1)
2. Understand of Requirements Engineering and Analysis Modeling. (K2)
3. Apply Systematic Procedure for Software Design and Deployment. (K3)
4. Compare and Contrast the Various Testing and Maintenance. (K3)
5. Manage Project Schedule, Estimate Project Cost and Effort required. (K5)
6. Estimation of Risk Identification and Risk Management. (K4)

CO- PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	2	3	3	2	3	3	3	3	-	-	3
CO2	3	2	-	2	3	3	2	2	3	3	3	-	-	3
CO3	3	2	-	3	3	3	3	1	3	3	3	1	1	3
CO4	3	1	-	2	3	3	2	3	3	3	3	-	1	3
CO5	3	3	-	3	3	3	3	1	3	3	2	1	2	3
CO6	3	2	-	3	3	3	2	1	3	3	3	1	2	3

SEMESTER - III

20ITPC303 SDG NO. 4 & 9	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the basic structure and operations of a Computer
- To study the implementation of Fixed-Point and Floating Point Arithmetic unit
- To understand Parallelism and Multi-core processors using Pipelined execution
- To understand the Cache memories, Virtual memories and Communication of I/O devices

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM 7

Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations –Decision Making – MIPS Addressing.

UNIT II ARITHMETIC OPERATIONS IN PROCESSORS 11

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism.

UNIT III PROCESSOR AND CONTROL UNIT 11

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined Datapath and Control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV PARALLELISM 7

Parallel Processing Challenges – Flynn's classification – SISD, MIMD, SIMD, SPM and Vector Architectures – Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors – Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT V MEMORY AND I/O SYSTEMS 9

Memory Hierarchy – memory technologies – Cache Memory – Measuring and Improving Cache Performance – Virtual Memory, TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus Operation – Arbitration – Interface circuits – USB.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", Eighth Edition, Pearson Education, 2010.
2. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 2012.
3. John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

WEB REFERENCES:

1. https://nptel.ac.in/courses/106/106/106106147/

OUTCOMES:

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

1. Understand the physical and logical aspects of Computer System (K2)
2. Analyze the various parameters of the processor to improve system performance. (K4)
3. Evaluate the fixed and floating point arithmetic operations. (K5)
4. Design data path and control unit of computer system (K6)
5. Understand parallel processing architectures with pipelining and avoidance of hazards (K2)
6. Define the various components of computer system hardware (K1)

CO- PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	1	2	3
CO2	3	3	2	-	-	-	-	-	-	-	-	2	3	3
CO3	3	3	3	-	-	-	-	-	-	-	-	2	3	3
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	3
CO5	3	1	1	-	-	-	-	-	-	-	-	3	3	3
CO6	3	1	1	-	-	-	-	-	-	-	-	3	2	3

SEMESTER - III

20ESEC301 SDG NO. 4	COMMUNICATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
- To study the various analog and digital modulation techniques
- To study the principles behind information theory and coding
- To study the various digital communication techniques

UNIT I ANALOG MODULATION 9

Amplitude Modulation – AM, DSBSC, SSBSC, VSB-Modulators and Demodulators – Angle modulation – PM and FM -Modulators and Demodulators – Super heterodyne receivers.

UNIT II PULSE MODULATION 9

Low pass sampling theorem – Quantization – PAM, PTM – Line coding – PCM, DPCM, DM & ADM - Time Division Multiplexing, Frequency Division Multiplexing.

UNIT III DIGITAL MODULATION AND TRANSMISSION 9

Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase shift keying – BPSK, QPSK, 8 PSK.QAM-8 QAM, 16 QAM – Comparison of various digital communication system, Inter Symbol Interference– Eye pattern.

UNIT IV INFORMATION THEORY AND CODING 9

Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding , Mutual Information, Channel capacity – Error control codes-Linear block codes, Cyclic codes, Syndrome calculation – Convolution Coding.

UNIT V WIRELESS COMMUNICATION 9

Spread Spectrum and Multiple Access Techniques –Global system for Mobile Communication (GSM)-Cellular Concept and Frequency Reuse-Satellite Communication-Bluetooth.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", Sixth Edition, Pearson Education, 2007.
2. Simon Haykin, "Communication Systems", Fourth Edition, John Wiley & Sons. 2001.
3. H Taub, D L Schilling, G Saha, "Principles of Communication Systems" Third Edition, TMH2007

REFERENCES:

1. S. Haykin "Digital Communications" John Wiley, 2005.
2. B.Sklar, Digital Communications Fundamentals and Applications", Second Edition, Pearson Education, 2007.
3. B.P.Lathi, "Modern Digital and Analog Communication Systems", Third Edition, Oxford University Press,2007
4. H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH, 2006.

ONLINE RESOURCES:

1. https://freevideolectures.com/search/communication-engineering/
2. https://www.tutorialspoint.com/principles_of_communication/index.htm

WEB RESOURCES:

1. https://swayam.gov.in/nd1_noc20_ee16/preview
2. https://www.scientechworld.com/education-software-training-and-skill- development/sku-online-learning/analog-and-digital-communication

OUTCOMES:

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

1. Interpret various modulation techniques to model a communication system (K3)
2. Discuss angle modulation techniques and compare various analog modulation techniques. (K5)
3. Evaluate the performance of digital modulation schemes such as BPSK, BFSK, QPSK, DPSK & QAM. (K4)
4. Illustrate and compare the Encoding schemes such as PCM, DPCM, DM & ADM and different waveform coding schemes. (K3)
5. Infer the channel coding theorem and error control coding and decoding schemes like block codes, hamming codes, cyclic codes, convolutional codes and viterbi decoder. (K4)

6. Analyze the different multiple access Techniques, cellular concept and free reuse for wireless communication. (K4)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	3	-	-	3	-	-	-	-	-	1
CO2	3	3	3	-	3	-	-	3	-	-	1	1	-	1
CO3	3	3	3	2	-	-	-	-	-	-	-	1	2	1
CO4	3	3	2	1	-	-	-	-	-	-	-	1	2	1
CO5	3	3	3	2	-	-	-	-	-	-	-	1	2	1
CO6	3	3	3	3	-	-	1	2	-	3	2	1	2	1

SEMESTER - III

20ITPL301 SDG NO. 4	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- 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 algorithm

LIST OF EXPERIMENTS :

1. Array implementation of Stack and Queue ADTs
2. Array implementation of List ADT
3. Linked list implementation of List, Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Trees and operations of Binary Trees
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues
9. Graph representation and Traversal algorithms
10. Applications of Graphs- Implementation of searching and sorting algorithms
11. Implementation of any two Collision Techniques in Hashing

TOTAL: 45 PERIODS

LAB REQUIREMENTS :

Turbo C/Dev C++, Borland C

OUTCOMES:

On completion of this laboratory course, the student should be able to

1. Write functions to implement linear and non-linear data structure operations. [K1]
2. Suggest appropriate linear / non-linear data structure operations for solving a given problem. [K2]
3. Design and analyze the time and space efficiency of data structure.[K2]
4. Apply sorting and searching techniques. [K3]
5. Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval. [K3]
6. Choose and implement efficient data structures and apply them to solve problems. [K3]

CO- PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	2	1	1	-	-	-	-	2	2	2	2
CO2	2	3	2	2	2	1	-	-	-	-	2	3	2	2
CO3	3	3	2	2	1	1	-	-	-	-	2	2	2	2
CO4	3	3	2	2	1	1	-	-	-	-	2	3	2	2
CO5	1	2	2	1	2	1	-	-	-	-	1	1	2	2
CO6	1	2	2	1	1	-	-	-	-	-	1	1	2	2

SEMESTER - III

20CSPL301 SDG NO. 4 & 9	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of Packages, Inheritance and Interfaces
- To develop a Java application with Threads and Generic classes
- To make the students understand life cycle of the Applets and its functionality

LIST OF EXPERIMENTS :

1. Basic JAVA Programs
   a. Write a program to find the sum of individual digits of a positive integer.
   b. Write a program to generate the first n terms of the sequence.
   c. Write a program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
   d. Write a program to find both the largest and smallest number in a list of integers.
   e. Write a program to find factorial of list of number reading input as command.
2. Write a program to calculate bonus for different departments using method overriding.
3. Write a program to sort list of elements in ascending and descending order and show the exception handling.
4. Write a program to implement the concept of importing classes from user defined package and creating packages.
5. Write programs that illustrate how the following forms of inheritance are supported:
   a) Single inheritance
   b) Multiple inheritance
   c) Multi level inheritance
   d) Hierarchical inheritance
6. Write a program to demonstrate use of implementing interfaces.
7. Write a program to implement interfaces all string operations.
8. Write a program to create student report using applet, read the input using text boxes and display the output using buttons.
9. Write a program to implement thread priorities.
10. Write a program to implement thread, applets and graphics to animate ball movement.
11. JAVA Applet program
    a) Write a Applet program using paint brush
    b) Write a program to display analog clock using Applet
    c) Write a program to create different shapes and fill colors using Applet
12. JAVA Event Handling program
    a) Write a program that display the x and y position of the cursor movement using Mouse
    b) Write a program that identifies key-up key-down event user entering text in a Applet

13. JAVA programs on Swings
    a) Write a program to build a Calculator in Swings
    b) Write a program to display the digital watch in swing
    c) Write a program that to create a single ball bouncing inside a JPanel.
    d) Write a program JTree as displaying a real tree upside down

TOTAL : 45 PERIODS

LAB REQUIREMENTS :

Hardware :

Desktop Systems - Pentium IV with 2 GB RAM
160 GB HARD Disk
Monitor 1024 x 768 colour

Software :

Windows operating system
JDK 1.8

OUTCOMES:

On completion of this laboratory course, the student should be able to

1. Write Java programs in accordance with the object oriented programming concepts. (K6)
2. Design user defined java packages. (K6)
3. Create Java programs using Inheritance and Polymorphism. (K6)
4. Implement Error-handling techniques using Exception handling and Multithreading. (K6)
5. Develop Applet program and GUI using Swing components. (K6)
6. Enumerate the event handling techniques in Java Programming. (K5)

CO- PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	2	-	-	-	-	2	2	3	2
CO2	2	2	3	2	-	2	-	-	-	-	2	2	3	2
CO3	2	2	3	2	-	2	-	-	2	2	2	2	3	2
CO4	3	3	2	2	-	2	-	-	-	-	2	2	3	2
CO5	3	3	3	2	-	2	-	-	-	-	2	2	3	2
CO6	2	3	3	2	-	2	-	-	2	2	2	2	3	2

SEMESTER - III

20ITTE301 SDG NO. 4,11 &15	LIVE-IN-LAB - I	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To understand the engineering aspects of design with reference to simple products
- To foster innovation in design of products
- To develop design that add value to products and solve technical problems.
- To create awareness among the students of the characteristics of several domain areas where IT can be effectively used

COURSE PLAN :

Study: Take minimum three simple products, processes or techniques in the area of specialization, study, analyze and present them. The analysis shall be focused on functionality, construction, quality, reliability, safety, maintenance, handling, sustainability, cost etc. whichever are applicable. Each student in the group has to present individually; choosing different products, processes or techniques.

Design: The project team shall identify an innovative product, process or technology and proceed with detailed design. At the end, the team has to document it properly and present and defend it. The design is expected to concentrate on functionality; design for strength is not expected.

Note: *The one hour/week allotted for tutorial shall be used for discussions and presentations. The project team (not exceeding four) can be students from different branches, if the design problem is multidisciplinary.*

EVALUATION:

1. First evaluation (Immediately after first internal examination) : 20 marks
2. Second evaluation (Immediately after second internal examination): 20 marks
3. Final evaluation (Last week of the semester) : 60 marks

Note: *All the three evaluations are mandatory for course completion and for awarding the final grade.*

OUTCOMES:

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

1. List the problems and conduct literature survey to identify the gap and come up with an application oriented research problem in the specific domain.(K1)
2. Understand the project characteristics and explore necessary tools and components needed at various stages of the project(K2)
3. Design and validate the proposed system using simulation.(K3)
4. Develop the Prototype of the proposed system by adapting Industrial safety standards and best financial management practices(K5)
5. Analyze the obtained results and prepare a technical report.(K4)
6. Evaluate the project and go for journals and patents publication.(K5)

CO- PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2	2	2	3	2	2	3	3	3
CO2	3	3	3	2	3	3	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	2	3	3	3	3	3	3
CO4	2	2	2	1	2	1	1	1	3	2	3	3	3	2
CO5	2	2	2	1	2	1	1	1	3	2	3	3	3	2
CO6	2	2	2	1	2	1	1	1	3	2	3	3	3	2

SEMESTER - III

20ITTP301 SDG NO. 4	SKILL ENHANCEMENT	L	T	P	C
		0	0	2	1

APTITUDE & COGNITIVE SKILLS – PHASE 1

OBJECTIVE:

- To educate and enrich the students on quantitative ability, reasoning ability, and verbal ability.

UNIT I QUANTITATIVE ABILITY – I **6**

Problems on Trains - Time and Distance - Height and Distance - Time and Work

UNIT II QUANTITATIVE ABILITY – II **6**

Problems on Ages - Alligation or Mixture - Chain Rule - Simple Interest - Simple Equation - Theory Of Equation.

UNIT III REASONING ABILITY – I **6**

Analytical Reasoning - Pipes and Cistern - Logical Problems - Logical Games - Logical Deduction - Data Sufficiency - Arithmetic Reasoning

UNIT IV VERBAL ABILITY – I **6**

Idioms & Phrases - Synonyms - Antonyms - Classification

UNIT V CREATIVITY ABILITY – I **6**

Venn Diagrams -Cube and Cuboids - Dice - Cubes and Dice - Figure Matrix.

TOTAL : 30 PERIODS

REFERENCES:

1. R. S. Agarwal ,"Quantitative Aptitude for Competitive Exams" .
2. Sarvesh Verma, Quantum CAT.
3. R. S. Agarwal , "A Modern Approach to Logical Reasoning".
4. Arun sharma , "Verbal Ability and Reading Comprehension".

PROBLEM SOLVING USING C PROGRAMMING AND PYTHON FOR DATA SCIENCE – PHASE 2

OBJECTIVES:

- To provide exposure to problem-solving through programming
- To train the student to the basic concepts of the C-programming language
- To understand the basic process of data sciences
- To use Python and Open Source Tools to read datasets and load datasets using pandas
- To provide hands on experience in C and Python programming

UNIT I INTRODUCTION TO PRINCIPLES OF PROGRAMMING 6

Introduction to Programming - Programming Domain – Artificial Intelligence - Systems Programming - Assembly Level Languages - Problem solving using Algorithms and Flowcharts.

UNIT II INTRODUCTION TO C PROGRAMMING 6

Features of C and its Basic Structure - Simple C programs – Constants - Integer Constants - Real Constants - Character Constants - String Constants -Floating-point Numbers - The type cast Operator - Interactive Programming.

Operators Expressions and Control statement - The goto statement - The if statement - The if-else statement - Nesting of if statements - The conditional expression - The break statement and continue statement.

UNIT III ARRAYS, STRINGS AND POINTERS 6

Arrays - Multidimensional Arrays – Strings - Basics of Pointers - Pointer Arithmetic - Similarities between Pointers - One-dimensional Arrays.

Structures, Unions and Functions: Basics of Structures - Arrays of Structures - Pointers to Structures - Function Basics - Function Prototypes - Passing Parameters - Structures and Functions Recursion.

UNIT IV INTRODUCTION TO PYTHON AND DATA SCIENCE 6

Python Basics and Data Structures - Introduction to Data Science - Working with Data in Python.

UNIT V DATA HANDLING WITH PYTHON 6

Dataset Reading - Loading with Pandas - Data Filtering , Cleaning and Manipulation using Pandas - Data Visualizations - Report Generations.

TOTAL : 30 PERIODS

REFERENCES:

1. Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill Education, 2008.
2. Stephen G. Kochan & Sams, "Programming in C", 3rd Edition, Pearson Education, 2004.
3. Wes McKinney, "Python for Data Analysis:Data Wrangling with Pandas, Numpy and IPython", O'reilly Publication, 2nd Edition,2017.

ONLINE RESOURCES:

1. https://www.tutorialspoint.com/python_data_science/index.htm
2. https://tanthiamhuat.files.wordpress.com/2018/04/pythondata sciencehandbook.pdf

COURSE OUTCOMES :

Upon completion of this course, the students should be able to:

1. Analyze their quantitative ability. (K4)
2. Understand the ability of arithmetic reasoning along with creative thinking and problem solving skills. (K2)
3. Create their verbal ability through vocabulary building and grammar. (K6)
4. Evaluate the situations to analyse the computational methods in order to identify and abstract the programming task involved. (K5)
5. Analyse tasks in which the numerical techniques are applicable in order to apply them to write, edit, compile, debug, correct, recompile and run programs. (K4)
6. Understand the data manipulation and visualization. (K2)

CO- PO & PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	3	2	-	3	2	3	-	2	-	-
CO2	-	-	-	-	3	2	-	3	2	3	-	2	-	-
CO3	-	-	-	-	3	2	-	-	1	3	-	2	-	-
CO4	-	-	-	-	3	2	-	3	3	3	-	2	2	2
CO5	-	-	-	-	3	2	-	-	2	3	-	2	2	2
CO6	-	-	-	-	3	2	-	-	2	3	-	2	2	2

SEMESTER - III

20MGMC301 SDG NO. 4	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

OBJECTIVES:

At the end of the course, the student is expected to

- To know about Indian constitution
- To know about central government functionalities in India
- To know about state government functionalities in India
- To know about Constitution function
- To Know about Constitutional remedies

UNIT I INTRODUCTION 6

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties

UNIT II STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT 6

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India.

UNIT III STRUCTURE AND FUNCTION OF STATE GOVERNMENT 6

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV CONSTITUTION FUNCTIONS 6

Indian Federal System – Centre – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries.

UNIT V CONSTITUTIONAL REMEDIES 6

Enforcement of fundamental rights - Power of parliament to modify the rights the conferred by this part in their application to forces.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.

2. R.C. Agarwal, (1997) "Indian Political System", S. Chand and Company, New Delhi.
3. M.V. Pyle (2019) , "An Introduction to The Constitution of India, 5/e", Vikas Publishing, New Delhi.
4 P.M. Bakshi, (2018) , "Constitution of India", Universal Law Publishing, New Delhi.

REFERENCES:

1. Sharma, Brij Kishore, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi.
2. U.R.Gahai, "Indian Political System", New Academic Publishing House, Jalandhar.

OUTCOMES:

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

1. Understand about Constitution & Fundamental rights of citizens. (K2)
2. Interpret the structure and hierarchy of Central and State Government. (K2)
3. Analyze the functions of Judiciary, Parliament and its constituent members. (K4)
4. Evaluate the functions and boundaries of Central and State Governments in respect of their powers, duties and Centre-State relationship. (K5)
5. Remember the Indian social structure in respect of caste, religion, language, rights to citizens particularly rights to women, children and weaker sections. (K1)
6. Analyze remedies and rights available to India Citizens. (K4)

CO – PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	-	-	-	-
CO2	-	-		-	-	1	-	-	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	-
CO5	-	-	-	-	-	2	-	3	-	-	-	-
CO6	-	-	-	-	-	2	-	2	-	-	-	-

SEMESTER - IV

20BSMA402 SDG NO. 4	PROBABILITY AND QUEUEING THEORY	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To impart necessary basic knowledge in Probability theory, Random Processes and Queueing models which are invariably used in Computer science courses

UNIT I PROBABILITY AND RANDOM VARIABLES 12

Probability – Axioms of probability – Conditional probability – Baye's theorem - Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Erlang and Normal distributions.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear Regression – Transformation of Random Variables – Central Limit Theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES 12

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT IV QUEUEING MODELS 12

Markovian queues – Birth and Death processes – Single and multiple server Queueing models – Little's formula - Queues with finite waiting rooms –Self-service model.

UNIT V ADVANCED QUEUEING MODELS 12

Finite source models - M/G/1 queue – Pollaczek-Khinchin formula - M/D/1 and M/EK/1 as special cases – Series queues – Open Jackson networks.

TOTAL: 60 PERIODS

TEXT BOOKS:

1 Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007. (1.1-1.3, 1.6, 1.7 - 1.7.1, 1.8, 1.13 - Exercise problems in the above sections ; 2.1 – 2.8, 3.1 – 3.5, 3.9 , 4.1 - 4.3, 4.4 - 4.4.2, 4.7 – 4.11, 5.1 - 5.7, 6.1 – 6.3, 6.8, 6.10, 8.1 - 8.5, 10.5 (10.5.1 -

10.5.6), 10.6, 10.7 – 10.7.1-10.7. 5) (Units I, II & III).

2. Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student 4th Edition, 2014. (1.1 – 1.5, 1.7, 2.1 - 2.7, 4.1, 4.2, 5.1 – 5.1.1) (Units IV and V)

REFERENCES:

1. Hwei Hsu, "Schaum's Outline Theory and Problems of Probability, Random variables and Random Processes", Tata Mcgraw Hill Edition, New Delhi, 2004.
2. Taha, H.A., " Operations Research", 9th Edition , Pearson India Education Services, Delhi,2016.
3. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.
4. Yates, R.D. and Goodman. D.J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
5. Veerarajan T., "Probability and Statistics, Random Processes and Queueing Theory", TataMc-Graw Hill Education Pvt. Ltd., New Delhi

WEB REFERENCES:

1. https://nptel.ac.in/courses/117103017/
2. https://nptel.ac.in/courses/111105041/
3. http://home.iitk.ac.in/~skb/ee679/ee679.html

ONLINE RESOURCES:

1. https://freevideolectures.com/course/3066/performance-evaluation-of-computer-systems/5
2. https://freevideolectures.com/course/3066/performance-evaluation-of-computer-systems/6

OUTCOMES:

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

1. Compute the probability, conditional probability and statistical averages of events and standard distributions. (K3)
2. Compute the probability and statistical averages of one dimensional and two dimensional random variables and use transformation of random variables to find the joint and marginal probability density functions. (K3)
3. Use the Central limit theorem to find probabilities of the sum of independent and identically distributed random variables and calculate the limiting state probabilities of discrete parameter Markov chains. (K3)

4. Classify and describe random processes. (K2)
5. Analyze various types of Markovian queuing models and evaluate its characteristics. (K4)
6. Analyze advanced queuing models and study their characteristics. (K4)

CO- PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	1
CO2	3	3	2	-	-	-	-	-	-	-	-	1
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	3	2	-	-	-	-	-	-	-	-	1
CO5	3	3	2	-	-	-	-	-	-	-	-	1
CO6	3	3	2	-	-	-	-	-	-	-	-	1

SEMESTER - IV

20CSPC401 SDG NO. 4 & 9	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic concepts, functions of Operating Systems, Processes and Threads
- To analyze Scheduling algorithm and understand the concept of Deadlock
- To analyse various Memory Management schemes and understand I/O management and File Systems
- To be familiar with the basics of Linux system and Mobile OS like iOS and Android

UNIT I OPERATING SYSTEM OVERVIEW 7

Computer System Overview-Basic Elements - Instruction Execution - Interrupts - Memory Hierarchy - Cache Memory - Direct Memory Access - Multiprocessor and Multicore Organization - Operating System Overview-Objectives and Functions - Evolution of Operating System - Computer System Organization Operating System Structure and Operations - System Calls - System Programs - OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT 11

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication - CPU Scheduling - Scheduling Criteria - Scheduling Algorithms- Multiple - Processor Scheduling - Real Time Scheduling - Threads - Overview - Multithreading Models - Threading Issues - Process Synchronization - The Critical - Section Problem - Synchronization Hardware - Mutex Locks - Semaphores - Classic Problems of Synchronization - Critical Regions - Monitors - Deadlock – System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.

UNIT III STORAGE MANAGEMENT 9

Main Memory – Background, Swapping, Contiguous Memory Allocation - Paging - Segmentation - Segmentation with Paging - 32 and 64 Bit Architecture Examples - Virtual Memory – Background - Demand Paging - Page Replacement - Allocation - Thrashing - Allocating Kernel Memory - OS Examples.

UNIT IV FILE SYSTEMS AND I/O SYSTEMS 9

Mass Storage System – Overview of Mass Storage Structure - Disk Structure - Disk Scheduling and Management - Swap Space Management - File-System Interface - File Concept - Access Methods - Directory Structure - Directory Organization - File System Mounting - File Sharing and Protection - File System Implementation- File System Structure - Directory Implementation - Allocation Methods - Free Space Management - Efficiency and Performance - Recovery - I/O Systems – I/O Hardware - Application I/O Interface - Kernel I/O Subsystem - Streams - Performance.

UNIT V CASE STUDY 9

Linux System - Design Principles - Kernel Modules - Process Management - Scheduling - Memory Management - Input-Output Management - File System - Inter-Process Communication - Mobile OS - iOS and Android - Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.

TOTAL : 45 PERIODS

TEXT BOOK :

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES :

1. Ramez Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.

2. AchyutS.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education, 2004.
4. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
5. Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 2004.
6. Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", Third Edition, O'Reilly, 2005.
7. Neil Smyth, "iPhone iOS 4 Development Essentials – Xcode", Fourth Edition, Payload media, 2011.

WEB REFERENCES :

1. https://nptel.ac.in/courses/106/106/106106144/
2. https://www.coursera.org/courses?query=operating%20system
3. https://www.computerhope.com/jargon/o/os.html
4. https://www.os-book.com/OS9/slide-dir/
5. http://web.iitd.ac.in/~minati/MTL458.html

ONLINE RESOURCES:

1. https://www.udacity.com/course/introduction-to-operating-systems--ud923
2. https://freevideolectures.com/course/3670/introduction-to-operating-systems

OUTCOMES:

Upon the completion of the course, the students should be able to

1. Understand the basic concepts and functions of the operating system. (K2)
2. Analyze various scheduling algorithms. (K4)
3. Understand deadlock, prevention and avoidance algorithms. (K2)
4. Compare and contrast various memory management schemes. (K4)
5. Understand the functionality of file systems (K2)
6. Understand the performance of administrative tasks on Linux servers. (K2)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	-	1	-	1	1	-	-	-	1	2	2
CO2	3	3	3	2	2	-	1	1	-	-	-	1	2	2
CO3	3	3	2	2	2	-	1	1	-	-	-	1	2	2
CO4	2	2	3	2	2	-	1	1	-	-	-	1	2	2
CO5	3	3	3	2	2	-	1	1	-	-	-	1	2	2
CO6	3	3	2	2	2	-	1	1	-	-	-	1	2	2

SEMESTER - IV

20ITPC401 SDG NO. 4	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		2	1	0	3

OBJECTIVES:

- To understand and apply the algorithm analysis techniques
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To understand different algorithm design techniques
- To understand the limitations of Algorithmic power

UNIT I INTRODUCTION 10

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 9

Brute Force – Computing an – 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.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUES 9

Dynamic programming – Principle of optimality - Coin Changing Problem - Computing a Binomial Coefficient – Floyd's Algorithm – Multi Stage Graph - Optimal Binary Search Trees – Knapsack Problem and Memory functions - Greedy Technique – Container Loading Problem - Prim's Algorithm and Kruskal's Algorithm – 0/1 Knapsack Problem - Optimal Merge pattern - Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 8

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

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9

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: 45 PERIODS

TEXT BOOKS:

1. AnanyLevitin, "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, 2007.

REFERENCES:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V.Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Harsh Bhasin, "Algorithms Design and Analysis", Oxford university press, 2016.
4. S. Sridhar, "Design and Analysis of Algorithms", Oxford university press, 2014.

WEB REFERENCES:

1. https://nptel.ac.in/courses/106101060
2. https://www.cse.iitm.ac.in/course_details.php?arg=OTI
3. https://swayam.gov.in/nd1_noc19_cs47/previ

ONLINE RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/
2. http://www.learnalgorithms.in/
3. https://courses.cs.vt.edu/ csonline/Algorithms/Lessons/
4. http://openclassroom.stanford.edu/MainFolder/Course Page.php?course=IntroToAlgorithms.

OUTCOMES:

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

1. Review the fundamentals of algorithmic problem solving and analyzing efficiency of algorithms [K2]
2. Apply mathematical formulation,complexity analysis and methodologies to solve recurrence relations for algorithms [K3]
3. Compare the time complexities of various algorithms [K3]
4. Critically analyze the different algorithm design techniques for a given problem [K3]
5. Illustrate NP class problems and formulate solutions using standard approach [K2]
6. Articulate solutions for real life problems using algorithm design principles [K3]

CO-PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	0	0	0	0	0	0	0	0	0	0	1
CO2	3	3	1	0	0	0	0	0	0	0	0	0	0	1
CO3	2	3	0	1	0	0	0	0	0	0	0	0	0	1
CO4	2	3	0	2	0	0	0	0	0	0	0	0	0	1
CO5	1	2	0	1	0	0	0	0	0	0	0	0	0	1
CO6	1	2	1	2	0	0	0	0	0	0	0	0	0	1

SEMESTER - IV

20CSPC402 SDG NO. 4 & 9	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To design a database using ER diagrams, convert them to Relational Databases and to write SQL Queries
- To understand the fundamental concepts of Transaction Processing, Concurrency Control techniques and Recovery procedures
- To understand the Internal Storage structures and about the Query Processing Techniques
- To have an introductory knowledge about the Object Databases, XML Databases and NoSQL Databases

UNIT I DATABASE DESIGN **7**

Purpose of Database System – Views of Data –Database System Architecture-Data Models– Entity Relationship Model – ER Diagrams – Enhanced ER Model.

UNIT II RELATIONAL DATABASES **11**

Introduction to Relational Databases – Relational Model-ER-to-Relational Mapping– Keys –Relational Algebra – SQL Fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL-Functional Dependencies – Non-loss Decomposition – First – Second - Third Normal Forms - Dependency Preservation – Boyce/CoddNormal Form – Multi Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

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 IMPLEMENTATION TECHNIQUES **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 – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics - Cost Estimation.

UNIT V ADVANCED TOPICS **9**

Distributed Databases – Architecture - Data Storage - Transaction Processing –

Object Based Databases - Object Database Concepts – Object Relational Features - ODMG Object Model – ODL - OQL – XML Databases - XML Hierarchical Model – DTD - XML Schema –Xquery.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2020.
2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, McGraw-Hill Education, 2015.
3. G.K.Gupta,"Database Management Systems", Tata McGraw Hill, 2011.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_cs46/
2. http://www.nptelvideos.in/2012/11/database-management-system.html
3. https://www.classcentral.com/course/swayam-database-management-system-9914
4. http://learnsql.com
5. https://www.w3schools.com/sql/default.asp
6. https://www.khanacademy.org/computing/computer-programming/sql

OUTCOMES:

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

1. Discuss the concepts of database to apply the Relational, ER model for design and SQL for implementation of the database. (K2)
2. Recognize and identify the use of normalization and functional dependencies to refine the database system. (K1)
3. Execute various SQL queries for the Transaction Processing & Locking using concept of Concurrency control. (K4)
4. Evaluate the query processing techniques for the optimization of SQL queries. (K4)
5. Implement the indexing and hashing techniques for the organisation of database records. (K3)

6. Appraise how the advanced databases differ from the traditional databases. (K5)

CO- PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	2	1	0	0	0	0	0	0	2	2
CO2	2	2	2	2	1	1	0	0	0	0	0	0	2	2
CO3	2	1	2	1	2	1	0	0	0	0	0	0	2	2
CO4	2	2	2	2	1	1	0	0	0	0	0	0	2	2
CO5	2	2	2	2	1	1	0	0	0	0	0	0	2	2
CO6	2	2	2	1	2	1	0	0	0	0	0	0	2	2

SEMESTER - IV

20CSPW401 SDG NO. 4 & 9	COMPUTER NETWORKS WITH LABORATORY	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To understand the protocol layering and physical level communication
- To understand the various components required to build different networks and analyze the performance of a network
- To learn the functions of network layer and the various routing protocols
- To familiarize the functions and protocols of the Transport layer

UNIT I INTRODUCTION AND PHYSICAL LAYER 9

Networks – Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.

UNIT II DATA-LINK LAYER & MEDIA ACCESS 9

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III NETWORK LAYER 9

Network Layer Services – Packet switching – Performance – IPV4 Addresses –

Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT IV TRANSPORT LAYER AND APPLICATION LAYER 9

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram protocol – Transmission Control Protocol – SCTP.

UNIT V APPLICATION LAYER 9

WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP.

LIST OF EXPERIMENTS : 15

1. Simple client server program.
2. Socket program for echo/ping commands.
3. Implementing Link state routing algorithm.
4. Implementing distance vector routing algorithm.
5. Study of Network Simulator (NS2 or NS3) and Simulation of Congestion Control Algorithms using NS.
6. Study of TCP/UDP performance using Simulation tool.
7. Simulation of error correction code (like CRC).
8. Traffic Analysis using Wireshark.

TOTAL: 60 PERIODS

LAB REQUIREMENTS:

1. C/C++/JAVA/Equivalent compiler
2. Network Simulator like NS2/OPNET/Wireshark

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition TMH, 2013.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.

REFERENCES:

1. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2013.
2. Nader F. Mir, “Computer and Communication Networks”, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill Publisher, 2011.

4. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

WEB REFERENCES:

1. https://swayam.gov.in/nd2_cec19_cs07/preview
2. https://nptel.ac.in/courses/106105081/
3. https://www.isi.edu/nsnam/ns/

ONLINE RESOURCES:

1. https://ptgmedia.pearsoncmg.com/images/9780789749048/samplepages/0789749041.pdf
2. https://www.cse.iitb.ac.in/~sri/cs348/cs378-lab00-overview.pdf
3. https://freevideolectures.com/course/2276/computer-networks
4. https://www.youtube.com/watch?v=g8iY36onLeM&list=PLWPirh4EWFpHJrW1D9UB24wsbM3zx7QMx

OUTCOMES:

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

1. Understand the basic layers and its functions in computer networks. (K2)
2. Compare the performance of a network. (K5)
3. Understand the basics of how data flows from one node to another. (K2)
4. Analyse IEEE standards, analyze and design routing algorithms. (K4)
5. Implement the working of various transport and application layer protocols.(K3)
6. Analyse the protocols for various functions in the network.(K4)

CO-PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	3	2	2	-	2	1	-	1	3	2
CO2	3	3	2	-	-	-	1	-	-	-	-	-	2	1
CO3	3	3	3	-	1	-	1	-	-	1	-	1	3	1
CO4	3	3	3	-	-	-	1	-	-	1	-	-	2	2
CO5	3	3	3	-	1	-	2	-	-	1	-	1	3	2
CO6	3	3	3	-	1	-	1	-	-	1	-	-	3	2

SEMESTER - IV

20CSPL401 SDG NO. 4 & 9	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To learn Unix commands and Shell programming
- To implement various CPU scheduling algorithm, Process Creation and Interprocess Communication
- To implement Deadlock avoidance and Deadlock Detection algorithms
- To implement Page Replacement algorithms and File strategies

LIST OF EXPERIMENTS :

1. Basics of UNIX commands & Administrator commands (man, uptime, users, service, pkill, pmap, wget, free, Shutdown commands, ping, su, who, env).
2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
3. Write programs to simulate UNIX commands like cp, ls, grep, etc.
4. Shell Programming.
5. Write programs to implement the various CPU Scheduling Algorithms.
6. Implementation of Semaphores.
7. Implementation of Shared memory and IPC.
8. Implementation of Bankers Algorithm for Deadlock Avoidance.
9. Implementation of Deadlock Detection Algorithm.
10. Write program to implement Threading & Synchronization Applications.
11. Implementation of the following Memory Allocation Methods for fixed partition
    a) First Fit b) Worst Fit c) Best Fit
12. Implementation of Paging Technique of Memory Management.
13. Implementation of the following Page Replacement Algorithms
    a) FIFO b) LRU c) LFU
14. Implementation of the various File Organization Techniques.
15. Implementation of the following File Allocation Strategies
    a) Sequential b) Indexed c) Linked

TOTAL: 45 PERIODS

LAB REQUIREMENTS

1. Standalone desktops with C / C++ / Java / Equivalent compiler 30 Nos. with Linux OS

OUTCOMES:

On completion of this laboratory course, the student should be able to

1. Compare the performance of various CPU Scheduling Algorithms (K4)
2. Implement Deadlock avoidance and Detection Algorithms (K2)
3. Implement Semaphores. Create processes and implement IPC (K2)
4. Analyze the performance of the various Page Replacement Algorithms (K4)
5. Implement File Organization and File Allocation Strategies (K2)
6. Implement File Allocation Strategies (K2)

CO-PO,PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	-	1	-	-	-	-	-	-	1	2	2
CO2	3	3	3	2	1	1	1	2	2	2	1	2	2	2
CO3	3	3	3	3	1	2	1	2	2	2	2	2	2	2
CO4	3	3	3	2	1	-	-	1	1	1	1	2	2	2
CO5	3	3	3	2	1	-	-	1	1	1	1	1	2	2
CO6	3	3	2	2	1	-	-	1	1	1	1	1	2	2

SEMESTER - IV

20CSPL402 SDG NO. 4&9	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To learn the use of Data Definition, Data Manipulation Commands, 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. Implementation of Views, Sequences and 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.

TOTAL: 45 PERIODS

LAB REQUIREMENTS

SOFTWARE

Front end: VB/VC ++/JAVA or Equivalent

Back end: Oracle / SQL / MySQL/ Postgres / DB2 or Equivalent

OUTCOMES :

On completion of this laboratory course, the student should be able to

1. Use typical data definitions and manipulation commands. (K1)
2. Design applications to test Nested and Join Queries. (K3)
3. Implement simple applications that use Views. (K3)
4. Critically analyze the use of Tables, Views, Functions and Procedures. (K4)
5. Make use of ER modeling and normalization to design and implement database. (K3)
6. Implement real life applications that require a Front-end Tool as a Team. (K3)

CO- PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	2	1	0	0	0	0	0	0	2	2
CO2	2	2	2	1	2	1	0	0	0	0	0	0	2	2
CO3	2	2	2	1	2	1	0	0	0	0	0	0	2	2
CO4	2	2	2	1	2	1	0	0	0	0	0	0	2	2
CO5	2	2	2	2	1	1	0	0	0	0	0	0	2	2
CO6	2	2	2	1	2	1	0	0	0	0	0	0	2	2

SEMESTER - IV

20ITTE401 SDG NO. 4,11&15	LIVE-IN-LAB - II	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To provide opportunities for the students, expose to Industrial environment and real time work
- To offer students a glimpse into real world problems and challenges that need IT based solutions
- To improve the team building, communication and management skills of the students
- To introduce students to the vast array of literature available of the various research challenges in the field of IT

COURSE METHODOLOGY:

1. This initiative is designed to inculcate ethical principles of research and to get involve in life-long learning process for the students.
2. The course must involve engineering design with realistic constraints. It must also include appropriate elements of the following: Engineering standards, design analysis, modeling, simulation, experimentation, prototyping, fabrication, correlation of data, and software development.
3. Project can be individual work or a group project, with maximum of 3 students. In case of group project, the individual project report of each student should specify the individual's contribution to the group project.
4. On completion of the project, the student shall submit a detailed project report. The project should be reviewed and the report shall be evaluated and the students shall appear for a viva-voce oral examination on the project approved by the Coordinator and the project guide.

EVALUATION:

1. First evaluation (Immediately after first internal examination) : 20 marks
2. Second evaluation (Immediately after second internal examination): 30marks
3. Final evaluation (Last week of the semester) : 50marks

Note: *All the three evaluations are mandatory for course completion and for awarding the final grade*

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students should be able to

1. Conduct literature survey to identify the gap and an application oriented research problem in the specific domain(K4)
2. Design and validate the proposed system using simulation(K6)
3. Prototype the proposed system(K5)
4. Analyze the obtained results and prepare a technical report(K4)
5. Publish the work in journals and apply for the patents.(K3)
6. Prepare for industrial environment and real time work(K3)

CO- PO, PSO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	2	2	2	3	2	2	3	3	3
CO2	3	3	3	2	3	3	2	2	3	3	3	3	3	3
CO3	2	2	2	1	2	1	1	1	3	2	3	3	3	2
CO4	2	2	2	1	2	1	1	1	3	2	3	3	3	2
CO5	2	2	2	1	2	1	1	1	3	2	3	3	3	2
CO6	2	2	2	2	3	2	2	2	2	2	3	3	3	3

SEMESTER - IV

20ITTP401 SDG NO. 4	SKILL ENHANCEMENT	L	T	P	C
		0	0	2	1

PROBLEM SOLVING SKILLS – PHASE 1

OBJECTIVES:

- Improve their quantitative ability.
- Improve their reasoning ability.
- Enhance their verbal ability through vocabulary building and grammar
- Equip with creative thinking and problem solving skills

UNIT I QUANTITATIVE ABILITY – III **6**

Compound Interest - Profit and Loss- Partnership - Percentage, Set Theory

UNIT II QUANTITATIVE ABILITY – IV **6**

True Discount-Ratio and Proportion - Simplification - Problems On H.C.F and L.C.M

UNIT III REASONING ABILITY – II **6**

Course of Action - Cause and Effect - Statement and Conclusion - Statement and Argument - Data Sufficiency (DS) - Statement and Assumption - Making Assumptions.

UNIT IV VERBAL ABILITY – II **6**

Change of Voice - Change of Speech - Letter and Symbol Series - Essential Part-Verbal Reasoning - Analyzing Arguments.

UNIT V CREATIVITY ABILITY – II **6**

Seating Arrangement - Direction Sense Test - Character Puzzles - Missing Letters Puzzles - Mirror &Water Images.

TOTAL : 30 PERIODS

REFERENCES:

1. R. S. Agarwal, "Quantitative Aptitude for Competitive Exams".
2. Sarvesh Verma, "Quantum CAT".
3. R. S. Agarwal, "A Modern Approach to Logical Reasoning"
4. Arun sharma, "Verbal Ability and Reading Comprehension".

ADVANCED C PROGRAMMING - PHASE 2

OBJECTIVES

- To improve C programming skills with understanding of code organization and functional hierarchical decomposition with using complex data types
- To able to facility with Unix command syntax and semantics

UNIT I INTRODUCTION TO RECURSION AND GROWTH FUNCTIONS **6**

Introduction to Recursion - Recurrence Relation - Deriving time complexity and space complexity using recurrence relation - Polynomial Equations - Compare growth functions - Nth Fibonacci Number - Exponent Function - Taylor Series - Tower of Hanoi.

UNIT II STORAGE CLASSES, THE PREPROCESSOR AND DYNAMIC MEMORY ALLOCATION **6**

Storage Classes and Visibility, Automatic or local vStorage Classes and

Visibility - Automatic or local variables - Global variables - Macro Definition and Substitution - Conditional Compilation - Dynamic Memory Allocation - Allocating Memory with malloc and calloc - Allocating Memory with calloc - Freeing Memory - The Concept of linked list - Inserting a node by using Recursive Programs - Deleting the Specified Node in a Singly Linked List.

UNIT III FILE MANAGEMENT AND BIT MANIPULATION 6

Defining and Opening a file - Closing Files - Input/output Operations on Files - Predefined Streams - Error Handling during I/O Operations - Random Access to Files - Command Line Arguments - The hexadecimal number system - C bitwise operators - How to generate all the possible subsets of a set - Tricks with Bits - Applications of bit operations.

UNIT IV OVERVIEW OF LINUX AWK AND CONTROL STRUCTURES IN AWK 6

Basics of AWK – Variables and Operators – Built-in variables – Conditional Statements – Loops

UNIT V ARRAYS AND BUILT-IN FUNCTIONS 6

Basics of array – Single Dimensional Array – Multidimensional Array – Bulit-in functions and User- Defined Functions.

TOTAL : 30 PERIODS

REFERENCES:

1. R. G. Dromey, "How to Solve It By Computer", Pearson, 1982
2. A.R. Bradley, "Programming for Engineers", Springer, 2011
3. Kernighan and Ritchie, "The C Programming Language", (2nd ed.) Prentice Hall, 1988
4. Arnold D. Robbins , “GAWK: Effective AWK Programming” 5th edition,2020.

ONLINE RESOURCES :

1. http://ce.sharif.edu/courses/95-96/1/ce153-12/resources/root/Books/Advanced%20C%201992.pdf
2. www.spokentutorial.org/

COURSE OUTCOMES :

Upon completion of this course, the students should be able to:

1. Analyze their quantitative ability. (K4)
2. Understand the ability of arithmetic reasoning along with creative thinking and problem solving skills. (K2)

3. Create their verbal ability through vocabulary building and grammar. (K6)
4. Evaluate code organization and functional hierarchical decomposition with complex data types. (K5)
5. Understand to improve C programming skills to apply advance structured and procedural programming. (K2)
6. Understand the Linux AWK concept and its working environment.(K2)

CO- PO & PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	3	2	-	3	2	3	-	2	-	-
CO2	-	-	-	-	3	2	-	3	2	3	-	2	-	-
CO3	-	-	-	-	3	2	-	-	1	3	-	2	-	-
CO4	-	-	-	-	3	2	-	3	3	3	-	2	2	2
CO5	-	-	-	-	3	2	-	-	2	3	-	2	2	2
CO6	-	-	-	-	3	2	-	-	2	3	-	2	2	2

Imagine the Future and

Make it happen!

Together let's build a better world where there is NO POVERTY and ZERO HUNGER.

We have GOOD HEALTH AND WELL BEING QUALITY EDUCATION and full GENDER EQUALITY everywhere.

There is CLEAN WATER AND SANITATION for everyone. AFFORDABLE AND CLEAN ENERGY

which will help to create DECENT WORK AND ECONOMIC GROWTH. Our prosperity shall be fuelled

by investments in INDUSTRY, INNOVATION AND INFRASTRUCTURE that will help us to

REDUCE INEQUALITIES by all means. We will live in SUSTAINABLE CITIES AND COMMUNITIES.

RESPONSIBLE CONSUMPTION AND PRODUCTION will help in healing our planet.

CLIMATE ACTION will reduce global warming and we will have abundant,

flourishing LIFE BELOW WATER, rich and diverse LIFE ON LAND.

We will enjoy PEACE AND JUSTICE through STRONG INSTITUTIONS

and will build long term PARTNERSHIPS FOR THE GOALS.

For the goals to be reached, everyone needs to do their part: governments, the private sector, civil society and **People like you.**

Together we can...

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