Sri

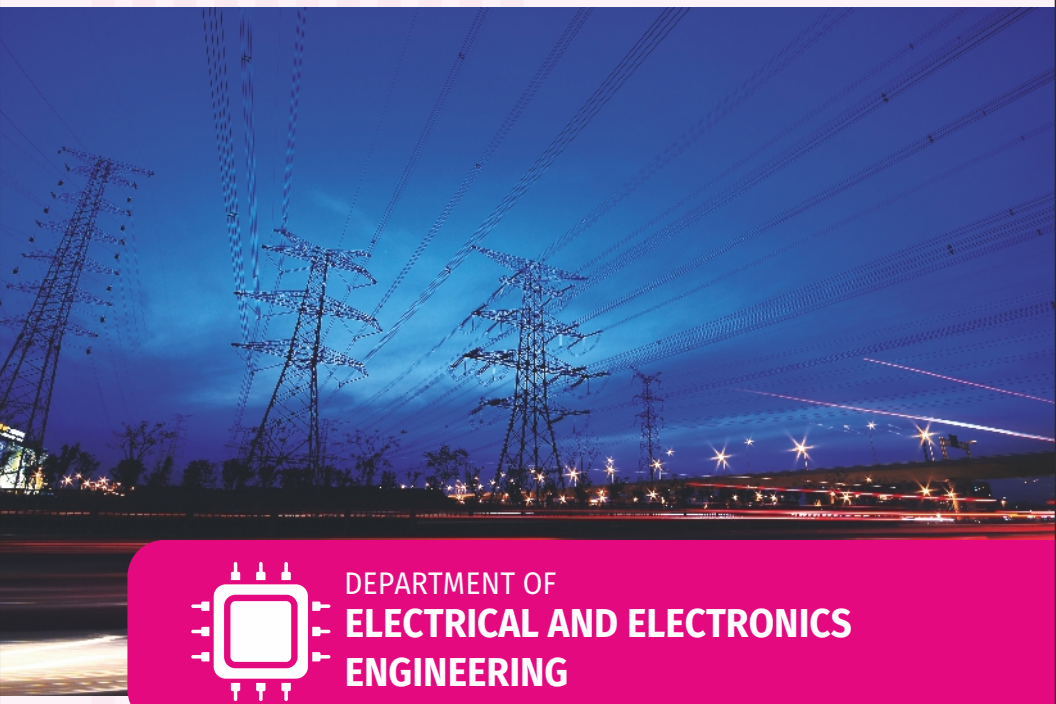
SAI RAM INSTITUTE OF TECHNOLOGY

An Autonomous Institution

West Tambaram, Chennai - 44

www.sairamit.edu.in

Approved by AICTE, New Delhi
Affiliated to Anna University



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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 ELECTRICAL & ELECTRONICS ENGINEERING

VISION

To become a front-runner, the department of Electrical and Electronics Engineering brings out competent engineers, innovators, researchers with human and ethical values, thereby contributing value to the knowledge based economy and society.

MISSION

The Electrical and Electronics Engineering department strives to develop talented professionals by providing high quality and effective education with commitment in the field of electrical engineering and an inspiring environment for innovation, research ideas to fulfill the needs of the public in an ethical and responsible manner. The department invokes the desire and ability of life-long learning, team spirit and leadership skills for pursuing successful career in electrical engineering.

AUTONOMOUS CURRICULA 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 Laboratory	0	0	3	3	1.5
8	20ESPL101	Programming in C Laboratory	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	20BSMA201	Engineering Mathematics -II	3	1	0	4	4
2	20HSEN201	Technical English - II	3	0	0	3	3
3	20ESIT201	Python Programming with lab	3	0	2	5	4
4	20BSPH201	Physics of Electron Devices	3	0	0	3	3
5	20BSCY201	Environmental Science and Engineering	3	0	0	3	3
6	20EEPC201	Electrical Circuit Analysis	2	1	0	3	3
PRACTICAL							
7	20ESGE201	Engineering Practices Laboratory	0	0	3	3	1.5
8	20EEPL201	Electric Circuits and Simulation Lab	0	0	3	3	1.5
VALUE ADDITIONS - II							
9	20TPHS201	Skill Enhancement	0	0	2	2	1
10	20HSMG201	Interpersonal Values	2	0	0	2	0
TOTAL						**31**	**24**

SEMESTER III

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
		THEORY					
1	20EEPC301	Analog Electronics	3	0	0	3	3
2	20EEPC302	DC Machines and Transformers	2	1	0	3	3
3	20EEPC303	Electromagnetic theory	3	1	0	4	4
4	20EEPC304	Digital Logic Circuits	3	0	0	3	3
5	20BSMA301	Linear Algebra, Partial Differential Equations and Transforms.	3	1	0	4	4
		PRACTICAL					
6	20EEPL301	Analog and Digital Circuits Laboratory	0	0	3	3	1.5
7	20EEPL302	DC Machines & Transformers Laboratory	0	0	3	3	1.5
8	20EETE301	Live-in-Lab – 1	0	0	2	2	1
		VALUE ADDITIONS - III					
9	20EETP301	Skill Enhancement	0	0	2	2	1
10	20MGMC301	Constitution of India	2	0	0	2	0
		TOTAL				**29**	**22**

SEMESTER IV

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
		THEORY					
1	20EE PC 401	Synchronous and Induction Machines	2	1	0	3	3
2	20EE PC 402	Transmission and Distribution	3	0	0	3	3
3	20EE PC 403	Measurements and Instrumentation	3	0	0	3	3
4	20EE PC 404	Control Engineering	3	1	0	4	4
5	20BS MA 403	Statistics and Numerical methods	3	1	0	4	4
		PRACTICAL					
6	20EE PL 401	Synchronous & Induction Machines Lab	0	0	3	3	1.5
7	20EE PL 402	Control Engineering &Instrumentation Lab	0	0	3	3	1.5
8	20EETE401	Live-in-Lab 2	0	0	2	2	1
		VALUE ADDITIONS - IV					
9	20EETP401	Skill Enhancement	0	0	2	2	1
		TOTAL				**27**	**22**

SEMESTER V

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20EEPC501	Power System Analysis	3	0	0	3	3
2	20EEPC502	Power Electronics	3	0	0	3	3
3	20EEPC503	Microprocessors and Microcontrollers	2	1	0	3	3
4	20XXELXXX	Professional Elective-I	3	0	0	3	3
5	20XXOEXXX	Open Elective –I	3	0	0	3	3
PRACTICAL							
6	20EEPL501	Power Electronics Lab	0	0	3	3	1.5
7.	20EEPL502	Microprocessors & Microcontrollers Lab	0	0	3	3	1.5
8.	20HSPL501	Communication and Soft Skills Lab	0	0	2	2	1
VALUE ADDITIONS - V							
9	20EETE501	Live-in-Lab 3	0	0	4	4	2
10	20EETP501	Skill Enhancement	0	0	2	2	1
TOTAL						**29**	**22**

SEMESTER VI

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20EEPC601	Solid State Drives & Control	3	0	0	3	3
2	20EEPC602	Power System Operation and Control	3	0	0	3	3
3	20EEPW601	Embedded Systems & IoT with Laboratory	3	0	2	5	4
4	20ITPC301	Data structures	3	0	0	3	3
5	20XXELXXX	Professional Elective-II	3	0	0	3	3
6	20XXOEXXX	Open Elective – II	3	0	0	3	3
PRACTICAL							
7	20EEPL601	Power System Simulation Laboratory	0	0	3	3	1.5
8	20ITPL301	Data Structures Laboratory	0	0	3	3	1.5
9	20EEPJ601	Innovative Design Project	0	0	2	2	1
VALUE ADDITIONS - VI							
10	20EETP601	Skill Enhancement	0	0	2	2	1
TOTAL						**30**	**24**

SEMESTER VII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20EEPC701	Distributed Generation and Microgrid	3	0	0	3	3
2	20EEPC702	Electrical Vehicles	3	0	0	3	3
3	20XXELXXX	Professional Elective-III	3	0	0	3	3
4	20XXELXXX	Professional Elective-IV	3	0	0	3	3
5	20HSMG601	Principles of Engineering Management	3	0	0	3	3
PRACTICAL							
6	20EEPL701	Renewable Energy Laboratory	0	0	4	4	2
7	20EEPJ701	Project Phase -1	0	0	4	4	2
VALUE ADDITIONS - VII							
8	20EETP701	Skill Enhancement	0	0	2	2	1
TOTAL						**25**	**20**

SEMESTER VIII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			TOTAL CONTACT HOURS	CREDITS
			L	T	P		
THEORY							
1	20EEELXXX	Professional Elective -V	3	0	0	3	3
PRACTICAL							
2	20EEPJ801	Project Phase - 2	0	0	8	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	13	10	15	68.5	4	6	4	7	7	3	Y	**167**
Percentage	17.7	7.8	6.0	9.0	41.0	2.4	3.6	2.4	4.2	4.2	1.8	-	

*IS-Internship

PROFESSIONAL ELECTIVES - I

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CREDIT	STREAM
			L	T	P		
1.	20EEEL501	Electric Energy Generation Systems	3	0	0	3	Power & Energy
2.	20EEEL502	Power Engineering & Instrumentation	3	0	0	3	Power & Energy
3.	20EEEL503	Solar And Wind Energy Systems	3	0	0	3	Power & Energy
4.	20EEEL504	Design of Electrical Machines	3	0	0	3	Electrical Machines & Control
5.	20EEEL505	Transducer Engineering 3	0	0	3	3	Electrical Machines & Control
6.	20EEEL506	Electrical Engineering Materials	3	0	0	3	Electrical Machines & Control
7.	20EEEL507	Discrete Time Signal Processing	3	0	0	3	Electronics & Embedded
8.	20EEEL508	Arduino and Raspberry pi Based System Design	3	0	0	3	Electronics & Embedded
9.	20EEEL509	Fundamentals of IOT for electrical engineering	3	0	0	3	Computer Technology
10.	20EEEL510	Industrial Safety	3	0	0	3	Industrial & Management

PROFESSIONAL ELECTIVES - II

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CREDIT	STREAM
			L	T	P		
1	20EEEL601	Power system Transients	3	0	0	3	Power & Energy
2	20EEEL602	High Voltage Engineering	3	0	0	3	Power & Energy
3	20EEEL603	Electric Energy Utilization and Conservation	3	0	0	3	Power & Energy
4	20EEEL604	Modeling and Analysis of Electrical Machines	3	0	0	3	Electrical Machines & Control
5	20EEEL605	Medical instrumentation	3	0	0	3	Electrical Machines & Control
6	20EEEL606	Digital Control Engineering Analysis and Design	3	0	0	3	Electrical Machines & Control
7	20EEEL607	Communication Engineering	3	0	0	3	Electronics & Embedded
8	20EEEL608	Electronic Product Design	3	0	0	3	Electronics & Embedded
9	20EEEL609	Industrial Data Communication	3	0	0	3	Computer Technology
10	20XXXXXXX	Digital Consumer Technology	3	0	0	3	Industrial & Management

PROFESSIONAL ELECTIVES - III

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CREDIT	STREAM
			L	T	P		
1	20EEEL701	Power Electronics for Renewable Energy Systems	3	0	0	3	Power & Energy
2	20EEEL702	Power Quality Studies	3	0	0	3	Power & Energy
3	20EEEL703	Energy Management and Auditing	3	0	0	3	Power & Energy
4	20EEEL704	Computer aided Design of Electrical Machines	3	0	0	3	Electrical Machines & Control
5	20EEEL705	Virtual Instrumentation with Labview	3	0	0	3	Electrical Machines & Control
6	20EEEL706	Micro Electro Mechanical Systems	3	0	0	3	Electrical Machines & Control
7	20EEEL707	Electro Magnetic Compatibility	3	0	0	3	Electronics & Embedded
8	20EEEL708	Nano technology	3	0	0	3	Electronics & Embedded
9	20XXXXXXX	Artificial Intelligence	3	0	0	3	Computer Technology
10	20EEEL709	Industrial Control And Automation	3	0	0	3	Industrial & Management

PROFESSIONAL ELECTIVES - IV

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CREDIT	STREAM
			L	T	P		
1	20EEEL 710	Power System Protection and Switch Gear	3	0	0	3	Power & Energy
2	20EEEL711	Restructured Power Systems	3	0	0	3	Power & Energy
3	20EEEL712	Energy Storage Technologies	3	0	0	3	Power & Energy
4	20EEEL713	Special Electrical Machines	3	0	0	3	Electrical Machines & Control
5	20EEEL714	Embedded Control of Electric Drives	3	0	0	3	Electrical Machines & Control
6	20EEEL715	Robotics and Control	3	0	0	3	Electrical Machines & Control
7	20EEEL716	Real Time Embedded Systems	3	0	0	3	Electronics & Embedded
8	20EEEL717	FPGA based system Design	3	0	0	3	Electronics & Embedded
9	20XXXXXXX	Computer Architecture and Parallel Processing	3	0	0	3	Computer Technology
10	20XXXXXXX	Industrial Management	3	0	0	3	Industrial & Management

PROFESSIONAL ELECTIVES - V

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CREDIT	STREAM
			L	T	P		
1	20EEEL801	FACTS and Custom power devices	3	0	0	3	Power & Energy
2	20EEEL802	Smart grid Technologies	3	0	0	3	Power & Energy
3	20EEEL803	EHVAC& EHVDC Power Transmission	3	0	0	3	Power & Energy
4	20EEEL804	Soft Computing Techniques for Electrical Engineers	3	0	0	3	Electrical Machines & Control
5	20EEEL805	Automotive Electrical and Electronics Systems	3	0	0	3	Electrical Machines & Control
6	20EEEL806	Control of Electric Vehicle	3	0	0	3	Electrical Machines & Control
7	20EEEL807	Advanced microprocessors	3	0	0	3	Electronics & Embedded
8	20EEPE808	High Speed Digital Design	3	0	0	3	Electronics & Embedded
9	20XXXXXXX	Fundamentals of Big Data Analytics	3	0	0	3	Computer Technology
10	20XXXXXXX	Work Ethics, Corporate Social Responsibility and Governance	3	0	0	3	Industrial & Management

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1 Graduates are prepared to gain sound foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve electrical engineering problems.

PEO2 Graduates are employed to function effectively as an individual, as a team member and as a leader with analytical skills to meet the needs of electrical field.

PEO3 Graduates are motivated to understand the importance of life-long learning and professional development with the background that allows in pursuing advanced studies in electrical and electronics engineering or related fields.

PEO4 Graduates are equipped with the knowledge of electrical & electronics engineering in core as well as multidisciplinary areas in innovative, dynamic and challenging environment for the research based teamwork.

PEO5 Graduates are trained to possess knowledge to excel in the operation and maintenance of electrical systems in various industries.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1 Capable to acquire knowledge on use of modern engineering tools and equipments to analyze problems necessary for electrical engineering practice.

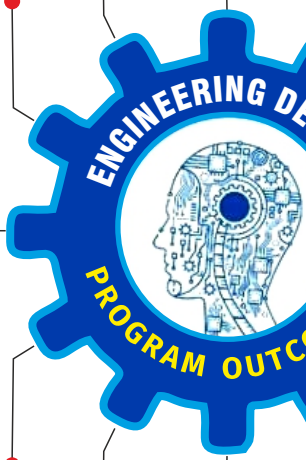
PSO2 Providing engineers with contemporary knowledge about electrical engineering and skills needed to fulfill the needs of society.

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)	17.8	31	29.5
Engineering Sciences(ES)	7.8	16	13
Humanities and Social Sciences (HS)	6.0	10	10
Professional Electives(EL)	7.2	12	12
Program Core+Program Lab (PC+PL)	34.6	75	57.5
Program theory with Lab (PW)	9.6	20	16
Open Electives (OE)	3.6	06	6
Talent Enhancement (TE)	3.0	08	5
Project (PJ)	4.2	14	7
Training & Placement (TP)	4.2	14	7
Internships/Seminars (IS)	1.8	-	3
Mandatory Courses (MC)	NA	06	NA
Total number of Credits		212	166

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 & 9	TECHNICAL ENGLISH - I	L	T	P	C
		3	0	0	3

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)

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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. (K6)
2. Demonstrate C programming development environment, compiling, debugging, linking and executing a program. (K6)
3. Develop C programs for simple applications making use of basic constructs, arrays and strings. (K6)
4. Develop C programs involving functions and recursion. (K6)

5. Develop C programs involving pointers, and structures. (K6)
6. Design applications using sequential and random access file. (K6)

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	1	2	2	3	3	2	3
CO2	3	3	3	3	2	1	-	1	2	2	3	3	1	3
CO3	3	3	-	3	2	-	1	1	-	2	-	3	3	2
CO4	3	3	3	3	2	1	1	1	2	2	3	3	1	3
CO5	3	3	3	-	2	-	1	-	2	2	3	-	2	1
CO6	3	3	3	3	2	1	1	1	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

20BSMA201 SDG NO. 4	ENGINEERING MATHEMATICS - II	L	T	P	C
		3	1	0	4

OBJECTIVES:

- The objective of this course is to familiarize the prospective engineers with techniques in Vector Calculus, Ordinary differential equations, Complex variables and Laplace transforms. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

UNIT I VECTOR CALCULUS 12

Gradient and Directional derivatives - Divergence and Curl- Vector identities - Irrotational and Solenoidal vector fields - Line integral over a plane curve - Surface integral - Volume integral – Gauss divergence, Green's and Stoke's theorems - Verification and application in evaluating line, Surface and volume integrals.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS 12

Second and higher order linear differential equations with constant coefficients - Method of variation of parameters - Homogeneous equation of Euler's and Legendre's types - System of simultaneous linear differential equations with constant coefficients.

UNIT III COMPLEX DIFFERENTIATION 12

Analytic functions- Necessary and sufficient conditions for analyticity in cartesian and polar coordinates (without proof) - Properties - Harmonic conjugate - construction of analytic functions- Conformal mapping - Mapping by functions $w = z+a, w=az, w=1/z, w=z^2$ - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Contour integrals, Cauchy- Goursat theorem (without proof) - Cauchy Integral formula (without proof) - Taylor's series - Zeroes of Analytic functions - Singularities - Laurent's Series - Residues – Cauchy Residue theorem (without proof) – Application of Residue theorem for evaluation of real integrals – use of circular contour and semicircular contour(without poles on real axis).

UNIT V LAPLACE TRANSFORM 12

Existence conditions – Transforms of elementary functions – Transform of Unit step function and Unit impulse function – Basic properties – Shifting

theorems – Transforms of derivatives and integrals – Initial and Final value theorems – Convolution theorem – Transform of Periodic functions – Application of solution of linear second order ordinary differential equations with constant coefficients.

TEXT BOOKS:

1. Ramana.B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008.
2. Erwin Kresizg, "Advance Engineering Mathematics", 9th Edition, John Wiley &Sons, 2006.

REFERENCES:

1. Dass, H.K., and Er. Rajnish Verma, "Higher Engineering Mathematics", S.Chand Private Ltd., 2011.
2. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2010.
3. Peter V.O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning, 2012.
4. E.A.Coddinton, "An Introduction to Ordinary Differential Equations", Prentice Hall India, 1995.
5. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 40th Edition, 2014.
6. N.P.Bali and Manish Goyal, "A text Book of Engineering Mathematics", Laxmi Publications, Reprint 2008.

WEB COURSES:

1. https://nptel.ac.in/courses/122107036/
2. https://nptel.ac.in/courses/111105134/
3. https://ocw.mit.edu/courses/mathematics/18-04-complex-variables-with-applications-spring-2018/
4. https://ocw.mit.edu/courses/mathematics/18-02-multivariable-calculus-fall-2007/
5. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/

ONLINE RESOURCES:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/lecture-1-introduction/
2. http://www.nptelvideos.com/course.php?id=90

COURSE OUTCOMES:

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

1. Compute the derivatives of scalar point, vector point functions and evaluate line, surface and volume integrals of vector point functions using Stokes, Greens, and Gauss divergence theorems. (K3)
2. Solve Ordinary differential equations of second and higher order with constant coefficients, variable coefficients and simultaneous linear differential equations. (K3)
3. Construct an analytic function and find the harmonic conjugate, apply the properties of analytic functions to check for harmonic and orthogonal functions and find the images of regions, straight lines and points in the Z-plane under the mappings

   $w = z + a, w = az, w = \frac{1}{z}, w = z^2$ and bilinear transformation. (K3)
4. Find the Taylor's series about a point and Laurent's series in an annular region of analytic functions and Evaluate integrals of analytic functions and real integrals over circular and semicircular contour using Cauchy Goursat theorem, Cauchy integral formula and Cauchy Residue theorem. (K3)
5. Find the Laplace transforms of simple and periodic functions by applying the definition and theorems on Laplace transforms. (K3)
6. Determine the Inverse Laplace transform using the theorems, the method of partial fractions, Convolution and solve linear second order ordinary differential equations with constant coefficients using Laplace transforms. (K3)

CO - PO, PSO 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 - 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

20ESIT201 SDG NO. 4	PYTHON PROGRAMMING WITH LABORATORY	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To Develop Python Programs with Conditionals and Loops
- To Use Python Data Structures – Lists, Tuples, Dictionaries, Sets
- To Define Python Functions and Work with Modules and Packages
- To Work with Python Classes, Objects and Handling Exceptions

UNIT I BASICS OF PYTHON PROGRAMMING 9

Python Interpreter and Interactive Mode - Features – History of Python – Literals – Variables and Identifiers – Data Types – Input Operation – Comments – Reserved Words – Indentation – Operators and Expressions – Operator Precedence– Operations on Strings – Other Data types – Type Conversion - Illustrative Programs: Use of various Operators, Evaluation of expressions, String Operations.

UNIT II DECISION CONTROL STATEMENTS 9

Conditionals: Boolean Values and Operators, Conditional (if) - Alternative (if-else) - Chained Conditional (if-elif-else) - Iteration: state - while - for - break - continue - pass - Illustrative Programs: Exchange the Values of Two Variables - Circulate the values of N Variables - Distance Between Two Points - Square Root - GCD - Exponentiation - Sum and Array of Numbers.

UNIT III 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 - Histogram.

UNIT IV FUNCTIONS, MODULES AND PACKAGES 9

Functions - Function 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 - Standard Library Modules – globals(), locals() and reload() - Illustrative programs: Fibonacci Series using functions - Arithmetic Operations using Module - Area of different shapes using Packages.

UNIT V CLASSES, OBJECTS AND EXCEPTION HANDLING 9

Classes and Objects – Defining Classes – Creating Objects – Data Abstraction and Hiding through Classes - init() method – Class Variables and Object Variables – Introduction to Errors and Exception Handling – Handling Exceptions – Multiple Except Blocks – else Clause – Raising Exceptions – Built-in and User-defined Exceptions – Finally Block.

LIST OF EXPERIMENTS 15

1. Write a Python program to perform
   a. Linear Search
   b. Binary Search
2. Write a Python program to perform Selection Sort.
3. Write a Python program to sort the given numbers using Insertion Sort.
4. Write a Python program to do sorting using Merge sort.
5. Write a Python program to find first n prime numbers.
6. Write a Python program to Multiply two matrices.
7. Write a Python program to create Student class and instantiate its Object.
8. Write a Python License verification process using Exception handling.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. ReemaThareja. "Python Programming Using Problem Solving Approach", Oxford University Press 2018.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, O'Reilly Publishers, 2016.

REFERENCES:

1. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python" Revised and updated for Python 3.2, Network Theory Ltd., 2011.
2. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-Disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.

4. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
6. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2013.
7. 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. Describe the syntax, semantics and control flow statements of Python programming. (K2)
2. Implement simple programs using control structures in Python. (K3)
3. Explain the methods to create and manipulate strings, lists, dictionaries, tuples and sets. (K2)
4. Articulate the concepts of functions, modules and packages in Python. (K2)
5. Implement simple programs using Python Data types and functions. (K3)
6. Apply the concepts of Exception handling, classes and objects. (K3)

CO - PO, MAPPING :

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

SEMESTER - II

20BSPH201 SDG NO. 4	PHYSICS OF ELECTRONIC DEVICES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To acquaint the electrical properties of materials.
- To present the principles of semiconductor physics and its applications.
- To educate the properties of magnetic and dielectric materials and their uses.
- To introduce the bipolar junction transistors.
- To explicit the field effect transistors, power and display devices.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory - Expression for electrical conductivity - Thermal conductivity expression - Wiedemann-Franz law - Success and failures - electrons in metals - Particle in a three dimensional box - 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 DIODES 9

Semiconductors - Intrinsic, Extrinsic semiconductor, Carrier concentration, PN junction diode- Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes, Special purpose diodes - Schottky barrier diode, Zener diode, Varactor diode ,Tunnel diode, LASER diode and LDR.

UNIT III MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS 9

Magnetism in materials - magnetic field and induction - magnetization - magnetic permeability and susceptibility - types of magnetic materials - microscopic classification of magnetic materials - Ferromagnetism: origin and exchange interaction - saturation magnetization and Curie temperature - Domain Theory - Hysteresis phenomenon - Ferrites. Dielectric materials: Polarization processes - dielectric loss - internal field - Clausius-Mosotti relation - dielectric breakdown.

UNIT IV BIPOLAR JUNCTION TRANSISTOR 9

NPN -PNP -Operations-Early effect-Current equations – Input and Output characteristics of CE, CB, CC - Hybrid -π model - h-parameter model, Ebers

Moll Model- Gummel Poon- model, Multi Emitter Transistor.

UNIT V FIELD EFFECT TRANSISTORS, POWER AND DISPLAY DEVICES 9

JFETs – Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage - Channel length modulation, D- MOSFET, E-MOSFET- Characteristics – Comparison of MOSFET with JFET.Power Devices-UJT, SCR, Diac, Triac, Display Devices-LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Donald A Neaman, "Semi-conductor Physics and Devices", Fourth Edition, TataMcGrawHill Inc.2012.
2. Salivahanan.S, Suresh Kumar. N, Vallavaraj.A, "Electronic Devices and circuits", Third Edition, Tata McGraw- Hill,2008.

REFERENCES:

1. Robert Boylestadand Louis Nashelsky, "Electron Devices and Circuit Theory", Pearson Prentice Hall, 10th edition, July2008.
2. R.S.Sedha, "A Text Book of Applied Electronics" S.Chand Publications, 2006.
3. Yang, "Fundamentals of Semiconductor Devices", McGraw Hill International Edition, 1978.

OUTCOMES:

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

1. Understand the electrical properties of materials. (K1)
2. Analyze the principles of semiconductor physics and its applications. (K2)
3. Explore the properties of magnetic and dielectric materials and their uses. (K2)
4. Understand the theory, construction and operation of the bipolar junction transistors. (K3)
5. Analyse the concept of field effect transistors, power and display devices (K2)
6. Learn the concepts of Physics towards engineering applications.(K1)

CO - PO, PSO MAPPING

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

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 find and implement 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 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

TEXTBOOKS:

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

20EEPC201 SDG NO. 4 & 9	ELECTRIC CIRCUITS ANALYSIS	L	T	P	C
		2	1	0	3

OBJECTIVES:

- To impart knowledge on electric circuits and solving circuit equations using network theorems
- To educate on obtaining the transient response of circuits and phenomenon of resonance and coupled circuits
- To introduce Phasor diagrams and analysis of three phase circuits

UNIT I BASIC CIRCUITS ANALYSIS 6 +3

Resistive elements - Ohm's Law Resistors in series and parallel circuits – Kirchoff's law, Network reduction: voltage and current division, Source transformation – Star Delta conversion. AC Fundamentals- Average and RMS value - Phasor Diagram – Power, Power Factor and Energy – Mesh current and node voltage - methods of analysis

UNIT II NETWORK THEOREMS FOR DC AND AC CIRCUITS 6+3

Superposition Theorem - Thevenin's and Norton's Theorems – Maximum power transfer theorem– Reciprocity Theorem – Millman's theorem.

UNIT III TRANSIENT RESPONSE ANALYSIS 6+3

R, L and C elements -Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. sinusoidal input.

UNIT IV RESONANCE AND COUPLED CIRCUITS 6+3

Series and parallel resonance– their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT V POLY PHASE CIRCUITS 6+3

Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurement in three phase circuits.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. SudhakarA and Shyam Mohan SP, "Circuits and Network Analysis andSynthesis", McGraw Hill, Fifth Edition, June 2015.
2. Charles K.Alexander,Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", Sixth Edition, McGraw Hill, February 14, 2019.
3. Joseph A.Edminister, Mahmood Nahri, "Electric circuits",(Schaum's outline series), Mc Graw- Hill, New Delhi, Fifth edition, February 5 2010.

REFERENCES

1. Chakrabarti A, "Circuits Theory Analysis and Synthesis", Dhanpath Rai & Sons,New Delhi, Seventh edition, 2015
2. A Nagoor kani, "Circuit Analysis," McGraw Hill,3rd January 11, 2016
3. William H. Hayt, Jack Kemmerly, Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill, eighth edition, July10 2013.
4. Mahadevan K ,Chitra C., "Electric Circuits Analysis," Prentice-Hall of India Pvt Ltd., New Delhi, Second edition, 2015.
5. Richard C. Dorf and James A.Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc., 9th edition, August 2014.

WEB RESOURCES:

1. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic
2. http://homepages.wmich.edu/~miller/ECE2100.html
3. https://engineering.purdue.edu/~ee202https://engineering.purdue.edu/~ee202

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc17_ee13/preview
2. https://www.coursera.org/learn/linear-circuits-dcanalysis

3. https://onlinecourses.nptel.ac.in/noc17_ee15/preview
4. https://swayam.gov.in/course/218-networks-and-systems

OUTCOMES:

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

1. Apply the laws, transformation concepts with respect to DC, AC Circuits. (K3)
2. Analyzing DC and AC circuits using mesh and nodal method. (K4)
3. Apply the concept of theorems for analyzing DC and AC circuits. (K3)
4. Apply the steady state and transients Response concepts related to DC and AC circuits. (K3)
5. Understand the Frequency Response of series and parallel circuits. (K2)
6. Analyze the concepts of coupled circuits ,single phase and three phase circuits. (K4)

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

SEMESTER - II

20ESGE201 SDG NO. 4,9,12	ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	3	1.5

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	2 Nos
	Digital Live-wire detector	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	2 Nos
	Demolition Hammer	2 Nos
	Circular Saw	2 Nos
	Planer	2 Nos
	Hand Drilling Machine	2 Nos
	Jigsaw	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 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

20EEPL20 SDG NO. 4&9	ELECTRIC CIRCUITS AND SIMULATION LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To simulate various electric circuits using Pspice/ Matlab/e-Sim /Scilab
- To gain practical experience on electric circuits and verification of theorems
- To gain practical Knowledge on electric circuits transients and resonance

LIST OF EXPERIMENTS

1. Simulation and experimental solving of electrical circuit problems using Kirchhoff's voltage and current laws.
2. Simulation and experimental solving of electrical circuit problems using Thevenin's theorem.
3. Simulation and experimental solving of electrical circuit problems using Norton's theorem.
4. Simulation and experimental solving of electrical circuit problems using Superposition theorem.
5. Simulation and experimental verification of Maximum Power transfer Theorem.
6. Study of Analog and digital oscilloscopes and measurement of sinusoidal voltage, frequency and power factor.
7. Simulation and Experimental validation of R-L & R-C electric circuit transients.

8. Simulation and Experimental validation of frequency response of RLC electric circuit.
9. Design and Simulation of series resonance circuit.
10. Design and Simulation of parallel resonance circuits.
11. Simulation of three phase balanced and unbalanced star, delta networks circuits.

TOTAL: 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1	Regulated Power Supply: 0 – 15 V D.C / Distributed PowerSource.	- 10 Nos
2	Function Generator (1 MHz)	- 10Nos.
3	Single Phase Energy Meter	- 1 No.
4.	Oscilloscope (20MHz)	- 10 Nos.
5.	Digital Storage Oscilloscope (20 MHz)	– 1 No.
6.	10 Nos of PC with Circuit Simulation Software (min 10 Users) (e-Sim / Scilab/ Pspice / Matlab /other Equivalent software Package) and Printer (1No.)	
7.	AC/DC - Voltmeters (10 Nos.), Ammeters (10 Nos.) and Multi-meters (10 Nos.) 8 Single Phase Wattmeter	– 3Nos.
9	Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box Each	- 6 Nos.
10	Circuit Connection Boards	- 10Nos.

Necessary Quantities of Resistors, Inductors, Capacitors of various capacities.

OUTCOMES:

On completion of the course on Electric circuit laboratory, the students should be able to

1. Use laboratory equipment and techniques to measure electrical quantities using multi-meters, power supplies and oscilloscopes and apply basic circuit laws. (K1)
2. Examine the DC and AC Network theorems and apply to them in laboratory measurements. (K2)
3. Analyze the transient response of series RL and RC electric circuits. (K4)
4. Simulate the frequency behaviour of RLC electric circuits. (K5)
5. Design and simulate the resonance circuits. (K6)
6. Design and simulate the balanced and unbalanced three phase circuits. (K6)

PO, PSO MAPPING :

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

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:

Upon completion of the 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

20EEPC301 SDG NO. 4	ANALOG ELECTRONICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following topics

- To impart knowledge on the operation and applications of FET and differential amplifier.
- To learn the Design of power amplifiers,feed back amplifier, oscillators.
- To Understand the Characteristics of op-amp.
- To gain knowledge on Design, construction, application circuits using op-amp.
- To understand Functional blocks and applications of special Ics like Timer And regulator ICs

UNIT I FET AMPLIFIERS AND DIFFERENTIAL AMPLIFIER 9

BJT - Biasing circuits, FET: JFET and MOSFET, Characteristics of CS, CG and CD amplifier configurations Biasing circuits – IGBT- Differential amplifier – Common mode and Difference mode analysis.

UNIT II POWER AMPLIFIERS AND OSCILLATORS 9

Classification of Power amplifiers:- Class A, B, AB and C Power amplifiers- Push-Pull and Complementary Symmetry Push-Pull amplifiers - Design of power output, efficiency and cross-over distortion- Advantages of negative feedback – Condition for oscillations, RC phase shift, wein bridge , Crystal oscillators.

UNIT III CHARACTERISTICS OF OPAMP 9

OP-AMP characteristics - DC characteristics, AC characteristics. Basic applications of op-amp – Comparators, Inverting and Non-inverting Amplifiers, differential amplifier, summer, differentiator and integrator, V/I and I/V converter.

UNIT IV APPLICATIONS OF OPAMP 9

Instrumentation amplifier, Multivibrators, Waveform generators, peak detector, clippers, S/H circuit - D/A converter (weighted resistor and R- 2R ladder types), A/D converters (flash type, dual slope type and successive approximation type) using opamp.

UNIT V ANALOG Ics **9**

Functional block, characteristics and applications - 555 Timer, IC voltage regulators – Fixed voltage regulators LM78XX, LM79XX, its application as Linear power supply - Variable voltage regulator 723, Switching regulator - ICL8038 function generator IC.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. David A. Bell,"Electronic devices and circuits", Oxford University higher education,5th edition 2008.
2. . D.Roy Choudhary, Shail Bala Jain, 'Linear Integrated Circuits', Fifth edition, New Age International Publishers, 2018.

REFERENCES

1. Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.
2. Robert L.Boylestad, "Electronic devices and circuit theory", 2002
3. S.Salivahanan, V.S.Kanchana Bhaaskaran, 'Linear Integrated Circuits and Applications', First edition, 2018, McGraw Hill Education.
4. David A. Bell, 'Op-amp & Linear Ics', Third edition, Oxford Higher Education, 2013.
5. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', Fourth edition (25 May 2015), Pearson Education.
6. Sedra and Smith, "Microelectronic circuits",7th Ed., Oxford University Press.

WEB RESOURCES:

1. https://www.electronics-tutorials.ws/
2. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_comparators.htm
3. https://www.khanacademy.org/science/electrical-engineering/ee-amplifiers
4. https://nptel.ac.in/courses/117107094/

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/117103063/
2. https://www.coursera.org/specializations/semiconductor-devices
3. http://www.nptelvideos.in/2012/11/digital-integrated-circuits.html
4. https://nptel.ac.in/courses/108/108/108108111/

COURSE OUTCOMES:

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

1. Acquire knowledge in Semiconductor devices like FET and IGBT. (K2)

2. Design the amplifiers with various biasing circuits for FET and BJT and analyze the differential amplifier. (K6)
3. Interpret the different types of Voltage, Power Amplifiers and Oscillators. (K4)
4. Summarize the Characteristics of OPAMP and analyze the various applications of Op-Amp. (K4)
5. Develop and correlate the various Non- linear applications of OPAMP and study the A/D converters and D/A converters. (K5)
6. Implementing the Semiconductor Devices and OPAMP ICs for doing projects and extrapolate the IC technologies on voltage regulators. (K2)

CO - PO, PSO MAPPING

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

SEMESTER - III

20EEPC302 SDG NO. 4,7,11	DC MACHINES AND TRANSFORMERS	L	T	P	C
		2	1	0	3

OBJECTIVES:

To impart knowledge on the following Topics

- Derive expressions for generated voltage and torque developed in Electrical Machines.
- Working principles of DC machines, determination of their no- load/load characteristics, starting and methods of speed control of DC motors.
- Constructional details, principle of operation, prediction of performance, the methods of testing the transformers.

UNIT I MAGNETIC CIRCUITS AND CONCEPTS IN ROTATING MACHINES **6+3**

Magnetic circuits –Laws governing magnetic circuits - Flux linkage, Inductance and energy – Statically and Dynamically induced EMF - Hysteresis

and Eddy Current losses - Field energy and co energy-force and torque equations – singly and multiply excited magnetic field systems

UNIT II DC GENERATORS **6+3**

Construction and components of DC Machines – Principle of operation - Lap and wave windings-EMF equations– circuit model – Armature reaction –Methods of Excitation- Commutation –Methods of improving commutation-Interpoles - compensating winding –Characteristics of DC generators.

UNIT III DC MOTORS **6+3**

Principle and operations - Types of DC Motors – Electrical and Mechanical Characteristics - Applications of DC Motor.

UNIT IV STARTERS, SPEED CONTROL AND TESTING OF DC MOTORS **6+3**

Starters and its types, speed control of DC motors – Braking of DC Motors - Plugging, Dynamic and Regenerative braking- Testing and Efficiency – Retardation test- Swinburne's test and Hopkinson's test.

UNIT V TRANSFORMERS **6+3**

Construction – principle of operation – Equivalent circuit parameters – Phasor diagrams -Losses – Testing – Efficiency and Voltage regulation-All day Efficiency-Sumpner's test –Parallel operation of Transformers-Auto transformer – Three Phase Transformer - Tap changing transformers-Protective Devices of Transformers.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J.B.Gupta,'Theory and Performance of Electrical Machines', S.K.Kataria& Sons , 15th Edition 2015
2. B.L.Theraja and A.K.Theraja ,'A Textbook of Electrical Technology' , S.Chand,2012

REFERENCES

1. P.S.Bimbhra, 'Electrical Machinery', Khanna Publishers,7th Edition, Reprint 2013.
2. B.R. Gupta,'Fundamental of Electric Machines' New age International Publishers, 3rd Edition,Reprint 2015.
3. S.K. Bhattacharya, 'Electrical Machines' McGraw - Hill Education, New Delhi,3rd Edition,2009.
4. Nagrath, I.J. and Kothari.D.P.,' Electric Machines', McGraw-Hill Education, 4th Edition, 2011.

5. Er.R.K.Rajput, 'Electrical Machines ', Laxmi Publications, 6th Edition,2016.

WEB RESOURCES:

1. www.electricaleasy.com
2. www.electrical4u.com
3. www.electricaltechnology.org

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/108/102/108102146/
2. https://nptel.ac.in/courses/108/105/108105155/
3. https://nptel.ac.in/courses/108/105/108105017/
4. https://nptel.ac.in/courses/108/106/108106071/
5. https://www.sciencedirect.com
6. https://www.btechguru.com

OUTCOMES:

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

1. Understand the concepts of electromechanical energy conversion. (K2)
2. Explain the constructional features, principle of operation and types of DC machines. (K4)
3. Describe the characteristics of DC generator/ motor. (K2)
4. Analyze the starting, speed control and braking of DC machines. (K4)
5. Analyze the performance of D.C machines by direct and indirect test. (K4)
6. Describe the construction, working principle of transformer and analyze the performance of transformer by studying open circuit, short circuit and sumpner's test. (K2)

CO- PO, PSO MAPPING:

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

SEMESTER - III

20EEPC303 SDG NO. 3,4,9,13	ELECTROMAGNETIC THEORY	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To introduce the basic mathematical concepts related to electromagnetic vector fields.
- To impart knowledge on the concepts of Electrostatic fields, electrical potential, energy density and their applications.
- To impart knowledge on the concepts of Magneto static fields, magnetic flux density, vector potential and its applications.
- To impart knowledge on the concepts of Different methods of emf generation and Maxwell's equations.
- To impart knowledge on the concepts of Electromagnetic waves and characterizing parameters.

UNIT I ELECTROSTATICS– I **6+6**

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields –Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and its applications.

UNIT II ELECTROSTATICS– II **6+6**

Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field – Electric field in free space, conductors, dielectrics - Dielectric polarization – Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

UNIT III MAGNETOSTATICS **6+6**

Lorentz force, Magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuital Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media – Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV ELECTRODYNAMIC FIELDS **6+6**

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current - Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.

UNIT V ELECTRO MAGNETIC WAVES **6+6**

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition,2015.
2. William H. Hayt and John A. Buck and Jaleel M. Akhtar 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2020.

REFERENCES

1. V.V.Sarwate, "Electromagnetic fields and waves", First Edition, New age Publishers, 1993.
2. J.P.Tewari, "Engineering Electromagnetics - Theory, Problems and Applications", Second Edition, Khanna Publishers.
3. Joseph. A.Edminister, "Schaum's Outline of Electromagnetics", Third Edition (Schaum's Outline Series), McGraw Hill, 2010.
4. K A Gangadhar, "Electromagnetic Field Theory", Khanna Publishers; Eighth Reprint: 2015.

WEB REFERENCES:

1. https://www.britannica.com/science/electrostatics
2. https://www.britannica.com/science/magnetostatics
3. http://www.clerkmaxwellfoundation.org/

OUTCOMES:

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

1 Understand the basic mathematical concepts related to electromagnetic vector fields. (K3)
2 Understand the basic concepts about electrostatic fields, electrical potential, energy density. (K3)
3 Acquire the knowledge in magneto static fields, magnetic flux density, vector potential. (K3)
4 Apply the concepts of Electrostatics and Magnetostatics to the Energy Storage Elements. (K4)
5 Understand the different methods of EMF generation and Maxwell's equations. (K4)
6 Understand the basic concepts electromagnetic waves and characterizing parameters. (K3)

CO- PO, PSO MAPPING

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

SEMESTER - III

20EEPC304 SDG NO. 4	DIGITAL LOGIC CIRCUITS	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on the following Topics

- To study various number systems and simplify the logical expressions using Boolean functions.
- To study combinational circuits.
- To design various synchronous and asynchronous circuits.
- To introduce asynchronous sequential circuits and PLDs.
- To introduce digital simulation for development of application oriented logic circuits.

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES 9

Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code) - Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS families -operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 9

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering -

counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Melay models, state diagram; state reduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Asynchronous sequential logic circuits-Transition stability, flow stability-race conditions, hazards & errors in digital circuits; analysis of asynchronous sequential logic circuits.

UNIT V PROGRAMMABILITY LOGIC DEVICES AND DIGITAL SIMULATION 9

Introduction to Programmability Logic Devices: PROM – PLA –PAL, CPLD-FPGA. RTL Design – Introduction to VHDL - Operators - Simple coding for combinational logic circuit and Sequential circuit (example : Added, Counter, Flipflop, Multiplexer and De-multiplexer).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Charles H.Roth, Jr, Lizy Lizy Kurian John, "Digital System Design using VHDL", Cengage, 2013.
2. M. Morris Mano, 'Digital Design with an introduction to the VHDL', Pearson Education, 2013.

REFERENCES

1. Mandal, "Digital Electronics Principles & Application", McGraw Hill Edu, 2013.
2. William Keitz, "Digital Electronics - A Practical Approach with VHDL", Pearson, 2013.
3. Thomas L.Floyd, "Digital Fundamentals", 11th edition, Pearson Education, 2015.
4. James W. Bignel, Digital Electronics, Cengage learning, 5th Edition, 2007.
5. D.P.Kothari,J.S.Dhillon, "Digital Circuits and Design", Pearson Education, 2016.

WEB REFERENCES:

1. https://nptel.ac.in/courses/108/105/108105132/
2. https://nptel.ac.in/courses/108/105/108105113/

ONLINE MATERIALS

1. https://www.coursera.org/learn/digital-systems
2. https://www.udemy.com/course/digital-electronics-logic-design/

OUTCOMES:

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

1. Interpret various number systems and simplify the logical expressions using Boolean functions. (K3)
2. Design various Combinational and sequential circuits. (K4)
3. Analyse synchronous and asynchronous sequential circuits. (K4)
4. Illustrate the design of logical circuits using programmability logic circuits. (K3)
5. Formulate the VHDL coding for combinational and sequential circuits. (K2)
6. Design of Synchronous and asynchronous circuits, without hazard and design of digital logic family. (K5)

CO- PO, PSO MAPPING :

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

SEMESTER - III

20BSMA301 SDG NO. 4	LINEAR ALGEBRA, PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- The aim of this course is to impart knowledge in the concepts of linear algebra as a prerequisite for the recent thrust areas of technological advancement
- To know the importance of partial differential equations in modeling various engineering problems
- To introduce the techniques of Fourier and Z- Transforms to analyze continuous and discrete signals

UNIT I VECTOR SPACES 15

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

UNIT II LINEAR TRANSFORMATION AND INNER PRODUCT SPACES 15

Linear transformation - Null and range spaces - Dimension theorem (Statement only) - Matrix of a linear transformation - Inner product - norm - Gram Schmidt orthogonalization process.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Integral surface passing through a given curve–Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT IV FOURIER TRANSFORMS 9

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 9

Z-transforms - Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 60 PERIODS

TEXTBOOKS:

1. Friedberg A.H., Insel A.J. and Spence L., "Linear Algebra", Prentice Hall of India, New Delhi, 2004. Unit I (Sec. 1.2, 1.3, 1.4 (linear combinations only), 1.5 & 1.6), Unit II (Sec. 2.1, 2.2, 6.1 & 6.2) (In Units I & II to include theorem statements only).
2. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., 3rd Edition, New Delhi. Unit III (Sec. 1.2, 1.5, 1.7, 1.11, 1.13, 1.14), Unit IV (Sec. 4.1, 4.2, 4.3, 4.6), Unit V(Sec. 5.1, 5.2, 5.3, 5.4, 5.5).

REFERENCES:

1. Strang G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

2. Lay D. C., "Linear Algebra and its Applications", 5th Edition, Pearson Education, 2015.
3. Kumaresan S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.
4. James G., "Advanced Modern Engineering Mathematics", Pearson Education, 2007.

WEB RESOURCES

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/
2. https://nptel.ac.in/courses/111/106/111106135/
3. https://nptel.ac.in/courses/111/103/111103021/

ONLINE RESOURCES:

1. https://www.khanacademy.org/math/linear-algebra
2. https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/
3. https://freevideolectures.com/course/3244/advanced-engineering-mathematics

OUTCOMES:

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

1. Determine the basis and dimension of a finite dimensional vector space. (K3)
2. Compute the Matrix, Range space and Null space of a linear transformation. (K3)
3. Construct orthonormal bases for inner product spaces using Gram Schmidt process. (K3)
4. Formulate and Solve Linear and non-linear Partial differential equations. (K3)
5. Find the Fourier transform, Inverse Fourier Transform, Fourier sine and cosine transforms of simple functions. (K3)
6. Apply Z-transforms to solve difference equations. (K3)

CO - PO, PSO MAPPING:

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

SEMESTER - III

20EEPL301 SDG NO. 4&9	ANALOG AND DIGITAL CIRCUITS LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To construct the characteristics of FET devices and to design a oscillator circuit
- To analyse the response of various digital circuits like Adder, subtractor, code converters, shift registers and counters
- To design and test the characteristics of timer, Op-amp and voltage regulator

LIST OF EXPERIMENTS :

1. Implementation of Boolean Functions, Adder and Subtractor circuits.
2. Code converters: Excess-3 to BCD and Binary to Gray code converter and vice- versa.
3. Parity generator and parity checker
4. Encoders and Decoders
5. Counters: Design and implementation of 3-bit modulo counters as Asynchronous types using FF ICs and specific counter IC.
6. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability IC's.
7. Study of multiplexer and de multiplexer
8. Timer IC application: Study of NE/SE 555 timer in Astable and Monostable mode operations.

9. Application of Op-Amp: inverting and non-inverting amplifier, Integrator and Differentiator.
10. Variability Voltage Regulator using IC LM317.
11. ExperimentalCharacterizationofMOSFET, BJT, PN diode.
12. ExperimentaldesignofRCphaseshiftoscillator using BJT.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Sl No.	Name of the equipment / component	Quantity	Remarks
1	Dual,(0-30V)variable Power Supply	10	-
2	CRO	9	30MHz
3	Digital Multimeter	10	Digital
4	Function Generator	8	1MHz
5	IC Tester (Analog)	2	
6	Breadboard	10	
7	Computer(PSPICE installed)	1	
8	IC741/ICNE555/566/565		
9	Digital IC types		
10	LED		
11	LM317		
13	ICSG3524/SG3525		
14	Transistor-2N3391		
15	Diodes,IN4001,BY126		
16	Zener diodes		
17	Potentiometer		
18	Step-downtransformer230V/12-0-12V		
19	Capacitors		
20	JFET semiconductor device		
21	Storage Oscilloscope		
22	Resistors		
23	Single Strand Wire		
24	Consumables (Sufficient quantity)		

OUTCOMES:

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

1. Derive the logical expression and execute the combinational logic circuits. (K5)
2. Realize the operation of flip-flops and design the sequential logic circuits. (K4)

3. Design the timer in astable and monostable mutivibrator using the appropriate IC. (K6)
4 Evaluate the necessary parameter to design the analog circuits. (K5)
5 Infer the characteristics of electronic devices like diode, BJT and MOSFET. (K2)
6 Analyze the applications of different electronics devices by conducting suitable experiments. (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	2	-	-	-	-	-	-	3	3
CO2	2	3	3	3	2	2	-	-	-	-	-	-	3	3
CO3	1	2	3	3	3	2	-	-	-	-	-	-	2	2
CO4	1	2	3	3	3	2	-	-	-	-	-	-	2	2
CO5	-	1	2	1	3	2	-	-	-	-	-	-	-	-
CO6	2	2	3	3	3	1	-	-	-	-	-	-	3	3

SEMESTER - III

20EEPL302 SDG NO. 4	DC MACHINES AND TRANSFORMERS LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

To expose the students to the following experimental skills

- Performing load tests on DC Generators / DC Motors
- Conducting tests in Transformers to determine equivalent circuit and separate the no-load losses
- Different types of starters for DC Motors

LIST OF EXPERIMENTS:

1. Open circuit and load characteristics of DC shunt generator - critical resistance and critical speed.
2. Load characteristics of DC compound generator with differential and cumulative connections.
3. Load test on DC shunt motor.
4. Load test on DC compound motor.

5. Load test on DC series motor.
6. Swinburne's test and speed control of DC shunt motor.
7. Hopkinson's test on DC motor – generator set.
8. Load test on single-phase transformer.
9. Open circuit and short circuit tests on single phase transformer.
10. Sumpner's test on single phase transformers.
11. Separation of no-load losses in single phase transformer.
12 Study of starters for DC motors.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1.	DC Shunt Motor with Loading Arrangement	– 3nos
2.	Single Phase Transformer	– 4nos
3.	DC Series Motor with Loading Arrangement	– 1 No.
4.	DC compound Motor with Loading Arrangement	– 1 No.
5.	DC Shunt Motor Coupled With DC Compound Generator	– 2nos
6.	DC Shunt Motor Coupled With DC Shunt Generator	– 2nos
7.	Tachometer -Digital/Analog	– 8nos
8.	Single Phase Auto Transformer	– 2nos
9.	Single Phase Resistive Loading Bank	– 2nos

OUTCOMES:

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

1. Predetermine the performance of DC machines and Transformers by conducting Suitable test. (K5)
2. Analyze the performance of DC Machines by conducting direct load test experimentally. (K4)
3. Analyze the performance of transformer by conducting suitable test experimentally. (K3)
4. Compare the performance characteristics obtained experimentally on various DC machines and select suitable DC machines for industrial applications. (K4)
5. Draw the equivalent circuit and predetermine the performance of transformers by conducting open circuit and short circuit tests. (K5)
6. Understand the Operating Principle of DC Motor Starters. (K2)

CO- PO,PSO MAPPING :

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

SEMESTER - III

20EETE301 SDG NO. 4,11,15	LIVE-IN-LAB - I	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To provide opportunities for the students, expose to Industrial environment and real time work
- To enable hands-on experience in the electronics hardware/Software domain
- To enable development of skill set for designing and realizing prototype electronic systems/simulation model

COURSE METHODOLOGY

- This initiative is designed to inculcate ethical principles of research and to get involve in life-long learning process for the students.
- The project work 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.
- 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.
- 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

- First evaluation (Immediately after first internal examination) : 20 marks
- Second evaluation (Immediately after second internal examination): 30marks
- 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. 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

20ECTP301 SDG NO. 4	SKILL ENHANCEMENT	L	T	P	C
		0	0	2	1

APTITUDE & COGNITIVE SKILLS – PHASE 1

COURSE 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 INTRODUCTION TO MATLAB & PSPICE

COURSE OBJECTIVE:

- The course aims to provide exposure to problem-solving through programming. It aims to train the student to the basic concepts of the C-programming language. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

UNIT I INTRODUCTION TO PRINCIPLES OF PROGRAMMING 6

Introduction to Programming - Programing 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 and One-dimensional Arrays Structures - Unions And Functions - Basics of Structures - Arrays of Structures - Pointers to Structures - Function Basics - Function Prototypes and Passing Parameters - Structures and Functions Recursion.

UNIT IV INTRODUCTION TO MATLAB 6

Introduction, Basic features, Starting MATLAB, Using MATLAB as a calculator, Creating MATLAB variables, Overwriting variable, Error messages, Making corrections, Controlling the hierarchy of operations or precedence, Controlling the appearance of floating point number, Managing the workspace Entering multiple statements per line, Miscellaneous commands, Exercises.

UNIT V INTRODUCTION TO PSPICE 6

Introduction - Installation - Preparing a circuit for simulation - Simulation using PSPICE Bias point details - DC sweep analysis - AC sweep analysis - Transient analysis - Frequency response.

TOTAL : 30 PERIODS

REFERENCES:

1. Programming in ANSI C - Balagurusamy - Tata McGraw-Hill Education, 2008
2. Programming in C (3rd Edition), by Stephen G. Kochan, Sams, 2004
3. Programming in C - Stephen G. Kochan, III Edition, Pearson Education.
4. Modeling and Simulation of Systems Using MATLAB and Simulink, Devendra K. Chaturvedi, CRC Press, 2010, ISBN 10: 1439806721
5. Learning to Program with MATLAB: Building GUI Tools,Wiley, 2013, ISBN 10: 0470936444
6. SPICE A Guide to Circuit Simulation and Analysis using Pspice, Tuinenga, Paul W. Prentice Hall PTR, 1992,
7. PSpice: a tutorial, Prentice Hall College Div, L. H. Fenical, 1992, ISBN 10: 0136811493

ONLINE RESOURCES

1. https://matlabacademy.mathworks.com/
2. https://www.tutorialspoint.com/matlab/index.htm
3. https://medium.com/quick-code/top-tutorials-to-learn-matlab-for-beginners-d19549ecb7b7
4. https://nptel.ac.in/courses/103/106/103106118/
5. https://www.youtube.com/watch?v=s4BuSwdT0j0
6. https://www.youtube.com/watch?v=6R_cf-QdLYs

WEB RESOURCES

1. https://www.mathworks.com/academia/books.html
2. https://in.mathworks.com/support/learn-with-matlab-tutorials.html
3. https://www.seas.upenn.edu/~jan/spice/PSpice_UserguideOrCAD.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. Apply working knowledge of MATLAB/ SCI LAB package to simulate and solve Electrical and Electronics Applications(K3)
6. Develop the knowledge of Electrical based system design using PSPICE (K6)

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

20EEPC401 SDG NO. 4,7,11	SYNCHRONOUS AND INDUCTION MACHINES	L	T	P	C
		2	1	0	3

OBJECTIVES:

To impart knowledge on the following Topics

- Construction, Working principle and performance of Synchronous Generators and Synchronous motors
- Construction, Principle of operation and Performance of Three phase and Single phase Induction machines
- Starting and speed control of three-phase induction motors

UNIT I SYNCHRONOUS GENERATORS **6+3**

Constructional details – Types of rotors – EMF equation – Armature reaction – Voltage regulation – EMF, MMF, ZPF and A.S.A methods – Two reaction theory – Slip test -Synchronizing and Parallel operation.

UNIT II SYNCHRONOUS MOTORS **6+3**

Principle of operation – V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed - Hunting – damper windings- Synchronous condenser.

UNIT III THREE PHASE INDUCTION MOTORS **6+3**

Constructional details – Types of rotors –- Principle of operation – Slip – Torque Equation - Condition for maximum torque - Torque-Slip characteristics – Equivalent circuit - Losses and efficiency – Load test - No load and blocked rotor tests - Separation of losses – Induction generators .

UNIT IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTORS **6+3**

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star- delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded connection-V/f control – Slip power recovery scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

UNIT V SINGLE PHASE INDUCTION MOTORS **6+3**

Constructional details of single phase induction motors – Double field revolving theory – Equivalent circuit – No load and blocked rotor test – Starting

methods of single-phase induction motors – Capacitor-start capacitor run Induction motor-Shaded pole Induction Motor.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J.B.Gupta, "Theory and Performance of Electrical Machines", S.K.Kataria & Sons , 15th Edition 2015.
2. B.L.Theraja and A.K.Theraja, "A Textbook of Electrical Technology", S.Chand, 2012.

REFERENCES

1. 1. P.S.Bimbhra, "Electrical Machinery", Khanna Publishers, 7th Edition, Reprint, 2013.
2. B.R. Gupta, "Fundamental of Electric Machines", New age International Publishers, 3rd Edition,Reprint 2015.
3. S.K. Bhattacharya, "Electrical Machines", McGraw - Hill Education, New Delhi,3rd Edition, 2009.
4. Nagrath, I.J. and Kothari.D.P., "Electric Machines", McGraw-Hill Education, 4th Edition, 2011.
5. Er.R.K.Rajput, "Electrical Machines ", Laxmi Publications, 6th Edition,2016.

WEB RESOURCES:

1. https://www.electricaleasy.com
2. https://www.electrical4u.com

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/108/105/108105131/
2. https://nptel.ac.in/courses/108/106/108106072/
3. https://www.sciencedirect.com
4. https://www.btechguru.com/engineering

OUTCOMES:

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

1. Understand the construction and working principle of single-phase and three phase machines. (K2)
2. Predetermine the performance characteristics of synchronous machines (K5)
3. Analyze the performance of single phase and three phase machines under various load conditions. (K4)

4. Starting and speed control of AC machines for its effective operation. (K4)
5. Describe various types of applications of Single and three phase machines. (K3)
6. Discuss the selection of AC machines for a specific applications. (K5)

CO- PO, PSO MAPPING:

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

SEMESTER - IV

20EEPC402 SDG NO.4 & 12	TRANSMISSION AND DISTRIBUTION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the structure of electric power system, types of substations, methods of grounding, EHVAC, HVDC and FACTS.
- To develop expressions for the computation of transmission line parameters, obtain the equivalent circuit for the transmission lines and determine the voltage regulation and efficiency.
- To understand the mechanical design of transmission lines and to analyze the voltage distribution in insulator strings to improve the efficiency.
- To study the construction and types of cables, methods of grading of cables and distribution system components.

UNIT I TRANSMISSION LINE PARAMETERS 9

Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects -Typical configurations and conductor types.

UNIT II MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

Performance of Transmission lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation, real and reactive power flow in lines - Formation of Corona – Critical Voltages – Effect on Line Performance.

UNIT III MECHANICAL DESIGN OF LINES 9

Mechanical design of OH lines – Line Supports –Types of towers – Stress and Sag Calculation – Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

UNIT IV UNDER GROUND CABLES 9

Underground cables - Types of cables – Construction of single core and 3 core cables – Insulation Resistance – Potential Gradient-Capacitance of Single – core and 3 core cables-Grading of cables - Power factor and heating of cables – DC cables.

UNIT V DISTRIBUTION SYSTEMS 9

Distribution Systems – General Aspects – Kelvin's Law – AC and DC distributions - Techniques of Voltage Control and Power factor improvement – Distribution Loss –Types of Substations -Methods of Grounding – Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009.
2. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

REFERENCES:

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition, 2008.
2. V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi,2013

3. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', McGraw-Hill Publishing Company limited, New Delhi, Second Edition, 2019.
4. Luces M. Fualken berry, Walter Coffer,'Electrical Power Distribution and Transmission', Pearson Education, 2007.

WEB REFERENCES:

1. https://www.electrical4u.com/transmission-line-in-power-system
2. https://www.electricaleasy.com/2017/03/underground-power-cables.html
3. https://www.eeeguide.com/insulating-materials-for-underground-cables

ONLINE RESOURCES:

1. https://www.coursera.org/lecture/electric-power-systems/transmission-subtransmission-imo4x
2. https://martechmedia.com/index.php/technical-elearning/course-catalog/electrical-distribution/

OUTCOMES:

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

1. Acquire knowledge about structure of power system, overhead lines and underground cable; identify the substation/distribution system components. (K2)
2. Compute the line parameters in single and three phase transmission lines, potential gradient and capacitance in single and three core cables. (K5)
3. Explain the types of conductor arrangement, effects of corona, need for mechanical support, grounding methods, insulators and sag in transmission line. (K4)
4. Model the short and medium transmission lines using nominal T and pi methods and analyze the regulation and efficiency under different loading conditions. (K4)
5. Determine the voltage distribution in insulator strings, calculate the sag and evaluate cable parameters. (K3)
6. Examine the methods of solving the DC / AC distribution systems and methods of improving the string efficiency of transmission lines. (K5)

CO- PO, PSO MAPPING:

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

SEMESTER - IV

20EEPC403 SDG NO. 4, 9&11	MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the basic functional elements of instrumentation and fundamentals of electrical and electronic instruments
- To understand the comparison between various measurement techniques
- To impart knowledge on various storage, display devices and to understand the working of various transducers and the data acquisition systems

UNIT I INTRODUCTION **9**

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration- Principle and types of analog and digital voltmeters, ammeters.

UNIT II ELECTRICAL AND ELECTRONIC INSTRUMENTS **9**

Principle and types of multimeters – Single and three phase wattmeters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

UNIT III COMPARATIVE METHODS OF MEASUREMENTS **9**

D.C potentiometers, D.C Bridges (Wheat stone, Kelvin and Kelvin Double bridge) & A.C bridges (Maxwell, Anderson and Schering bridges), transformer

ratio bridges, self-balancing bridges. Interference & screening – Multiple earth and earth loops - Electrostatic and electromagnetic Interference –Grounding techniques.

UNIT IV STORAGE AND DISPLAY DEVICES 9

Digital plotters and printers, CRT display, digital CRO, digital storage oscilloscope, Mixed Storage Oscilloscope, PQ Analyser, LED, LCD display – Data Loggers.

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS 9

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive Transducers – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – Smart sensors-Thermal Imagers.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', DhanpatRai and Co, 2018
2. Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, McGraw Hill Education Pvt. Ltd., 2007.

REFERENCES :

1. H.S. Kalsi, 'Electronic Instrumentation', McGraw Hill, III Edition 2010.
2. D.V.S. Murthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt Ltd, 2015.
3. J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria& Sons, Delhi, 2013.

WEB RESOURCES:

1. https://electrical4u.in/electrical-measurements/
2. https://www.electrical4u.com/electrical-measuring-instruments-types-accuracy-precision-resolution-speed/
3. https://www.electricaleasy.com/2014/06/instrument-transformers-ct-and-pt.html

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/108105153
2. https://swayam.gov.in/nd1_noc19_ee44/preview

OUTCOMES:

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

1. Integrate the Basic functional elements of instrumentation to measure electrical parameters. (K4)
2. Extend the concepts of basic elements of instrumentation to illustrate the working and functions of electrical, electronic instruments. (K2)
3. Interpret the usage of comparative methods to measure the basic electrical quantities like resistance, inductance and capacitance. (K2)
4. Distinguish various storage and display devices. (K4)
5. Choose the transducers for particular measurement. (K3)
6. Explain the data acquisition systems. (K4)

CO- PO, PSO MAPPING:

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

SEMESTER - IV

20EEPC404 SDG NO. 4	CONTROL ENGINEERING	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To understand the use of transfer function models for analysis physical systems and introduce the control system components
- To provide adequate knowledge in the time response of systems, steady state error analysis, open loop and closed loop frequency response systems
- To introduce stability analysis for Electrical, Mechanical systems and design of compensators

UNIT I SYSTEMS AND REPRESENTATION 9

Basic elements in control systems: – Open and closed loop systems – Electrical

analogy of mechanical – Transfer function – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE **9**

Time response: – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error –Effects of P, PI, PID modes of feedback control –Time response analysis.

UNIT III FREQUENCY RESPONSE **9**

Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domain specifications.

UNIT IV STABILITY **9**

Characteristics equation – Root locus construction- Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria.

UNIT V COMPENSATOR DESIGN **9**

Design of Lag and PID controllers in Frequency domain, Design of Lead-Lag controllers using Bode plots and Root locus plot. Design of PI, PD, PID controllers in Frequency domain and Time domain.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Nagarath, I.J. and Gopal, M., "Control Systems Engineering", New Age International Publishers, 2017. (Unit I – V)
2. Benjamin C. Kuo, "Automatic Control Systems", Wiley,2014.(Unit I – V)

REFERENCES:

1. Katsuhiko Ogata, "Modern Control Engineering", Pearson,2015.
2. Richard C.Dorf and Bishop, R.H., "Modern Control Systems", Pearson Education, 2009.
3. John J.D., Azzo Constantine, H. and HoupisSttuart, N Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Taylor & Francis Reprint2009.
4. RamesC.Panda and T. Thyagarajan, "An Introduction to Process Modelling Identification and Control of Engineers", Narosa Publishing House,2017.
5. M.Gopal, "Control System: Principle and design", McGraw Hill Education,2012.
6. Prof. S. D. Agashe, "Control Engineering", NPTEL Video Lecture Notes, IIT Bombay.

ONLINE RESOURCES:

1. https://freevideolectures.com/course/5301/dynamics-and-control
2. https://freevideolectures.com/course/2337/control-engineering

WEB RESOURCES:

1. https://swayam.gov.in/nd1_noc20_ee13/preview
2. https://nptel.ac.in/courses/107106081/
3. https://www.tutorialspoint.com/control_systems/index.htm

OUTCOMES:

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

1. Form various representations of system and to develop the mathematical model of the physical systems. (K2)
2. Analyze the response of the closed and open loop systems. (K4)
3. Analyze the stability of the closed and open loop systems. (K5)
4. Design appropriate compensator for the given specifications. (K6)
5. Develop and analyze state space models. (K5)
6. Solve complex control problems. (K3)

CO- PO, PSO MAPPING:

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

SEMESTER - IV

20BSMA403 SDG NO. 4	STATISTICS AND NUMERICAL METHODS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To define Null and Alternate hypothesis, identify small, large samples and gain knowledge in testing of hypothesis
- To differentiate between one way and two-way classification of ANOVA and gain knowledge in Design of experiments
- To impart knowledge on numerical solution of algebraic, transcendental and system of linear equations and learn to compute Eigen values and Eigen vectors
- To understand various numerical techniques of finding the interpolating polynomials in equal and unequal intervals and learn the concept of numerical differentiation and integration
- To gain knowledge in solving ordinary and partial differential equations using numerical techniques

UNIT I TESTING OF HYPOTHESIS 12

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

UNIT II DESIGN OF EXPERIMENTS 12

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 22 factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices .

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 12

Lagrange's and Newton's divided difference interpolations – Newton's

forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Single step methods : Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne's and Adams - Bash forth predictor corrector methods for solving first order equations. Solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by Crank Nicholson method – One dimensional wave equation by explicit method.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 2006.
4. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 2004.
5. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.

WEB RESOURCES:

1. https://www.classcentral.com/course/swayam-numerical-analysis-17709
2. https://online-learning.harvard.edu/course/statistics-and-r?delta=1

ONLINE RESOURCES:

1. https://freevideolectures.com/course/3057/numerical-methods-and-computation

2. https://nptel.ac.in/courses/111107105/
3. https://www.maths.unsw.edu.au/courses/math2089-numerical-methods-and-statistics

OUTCOMES:

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

1. Apply test of hypothesis for large and small samples in various real-life problems. (K3)
2. Apply chi-square test for goodness of fit and test for independence and interpret the results. (K3)
3. Construct an optimal design for practical problems and analyze the data to obtain objective conclusions. (K4)
4. Obtain the numerical solution of algebraic, transcendental equations and Eigen value problems. (K3)
5. Apply numerical techniques to interpolate data and find differentiation and integration. (K3)
6. Solve ordinary and partial differential equations using numerical techniques. (K3)

CO- PO, PSO MAPPING:

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

SEMESTER - IV

20EEPL401 SDG NO. 4,7,11	SYNCHRONOUS AND INDUCTION MACHINES LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To expose the students to the operation of synchronous machines and induction motors and give them experimental skill

LIST OF EXPERIMENTS:

1. Regulation of three phase alternator by EMF and MMF methods.
2. Regulation of three phase alternator by ZPF and ASA methods.
3. Regulation of three phase salient pole alternator by slip test.
4. Measurements of negative sequence and zero sequence impedance of alternators.
5. V and Inverted V curves of Three Phase Synchronous Motor.
6. Load test on three-phase induction motor.
7. No load and blocked rotor tests on three-phase induction motor (Determination of equivalent circuit parameters).
8. Separation of No-load losses of three-phase induction motor.
9. Load test on single-phase induction motor.
10. No load and blocked rotor test on single-phase induction motor.
11. Study of Induction motor Starters

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. DC Shunt Motor Coupled With Three phase Alternator – 4nos
2. DC Shunt Motor Coupled With Three phase Slip ring Induction motor – 1No.
3. Three Phase Induction Motor with Loading Arrangement – 2nos
4. Single Phase Induction Motor with Loading Arrangement – 2nos
5. Tachometer -Digital/Analog – 8nos
6. Single Phase Auto Transformer – 2nos
7. Three Phase Auto Transformer – 3nos
8. Single Phase Resistive Loading Bank – 2nos
9. Three Phase Resistive Loading Bank – 2nos

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Understand and analyze EMF and MMF methods. (K4)
2. Analyze the characteristics of V and Inverted V curves. (K4)
3. Understand the importance of Synchronous machines. (K4)
4. Understand the importance of Induction Machines. (K4)
5. Acquire knowledge on separation of losses. (K5)
6. Understand the starting methods of AC machines. (K4)

CO- PO, PSO MAPPING :

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

SEMESTER - IV

20EEPL402 SDG NO. 4 & 9	CONTROL ENGINEERING AND INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To provide knowledge on analysis of control system with controllers and compensators
- To provide knowledge on the design of control system with basics of instrumentation.
- To provide knowledge on instrumentation systems form various types of bridges and signal conditioning components

LIST OF EXPERIMENTS:

CONTROL SYSTEMS:

1. P, PI and PID controllers
2. Stability Analysis
3. Modeling of Systems – Machines, Sensors and Transducers
4. Design of Lag, Lead and Lag-Lead Compensators
5. Position Control Systems
6. Synchro -Transmitter- Receiver and Characteristics
7. Simulation of Control Systems by Mathematical development tools.

INSTRUMENTATION:

8. Bridge Networks –AC and DC Bridges
9. Dynamics of Sensors/Transducers
   a. Temperature b. Pressure c. Displacement d. Optical e. Strain f. Flow
10. Power and Energy Measurement

11. Signal Conditioning a. Instrumentation Amplifier b. Analog – Digital and Digital –Analog converters (ADC and DACs)
12. Process Simulation.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. PID controller simulation and learner kit – 1 No.
2. Digital storage Oscilloscope for - 3 Nos
3. DC motor –Generator test set-up -1 No
4. CRO 30MHz – 5 Nos
5. Function Generator 2 MHZ –5 Nos
6. Position Control Systems Kit – 1 No., Tacho Generator Couplingset - 1 No
7. AC Synchro transmitter& receiver –1 No
8. Stepper motor – 1 No
   Digital multi meters - 15 Nos
   Speed and torque sensors -5 Nos
9. Personal computers with control system simulation package - 10 Nos

OUTCOMES:

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

1 Understand control theory and apply them to electrical engineering problems. (K3)
2. Analyze the various types of converters. (K4)
3. Design various compensators and analyse the stability. (K6)
4. Verify the concepts of bridge networks. (K5)
5. Analyse and design signal conditioning circuits. (K3)
6. Study the simulation packages. (K3)

CO- PO, PSO MAPPING :

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

SEMESTER - IV

20EETE401 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 enable hands-on experience in the electronics hardware/Software domain
- To enable development of skill set for designing and realizing prototype electronic systems/simulation model

COURSE METHODOLOGY

- This initiative is designed to inculcate ethical principles of research and to get involve in life-long learning process for the students.
- The project work 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.
- 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.
- 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

- First evaluation (Immediately after first internal examination) : 20 marks
- Second evaluation (Immediately after second internal examination): 30marks
- 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 will 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

20ECTP401 SDG NO. 4	SKILL ENHANCEMENT	L	T	P	C
		0	0	2	1

PROBLEM SOLVING SKILLS – PHASE 1

COURSE OBJECTIVE:

- 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 AND INTRODUCTION TO ETAP & PSCAD - PHASE 2

COURSE OBJECTIVE:

- The course is oriented to those who want to advance structured and procedural programming understating and to improve C programming skills. The major objective is to provide students with understanding of code organization and functional hierarchical decomposition with using complex data types.

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 variables - Global variables - Macro Definition and Substitution - Conditional Compilation - Dynamic Memory Allocation - Allocating Memory with malloc and callo 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 ETAP **6**

Power System Modeling-Load Flow Study & Evaluation, Cable Sizing Study IEC / BS / NFC Short Circuit Study, Evaluation & Result Analyzer - IEC, Protective Device Coordination / Selectivity / Sequence-of-Operation-Auto Evaluation of Protection & Selectivity 1-AC Arc Flash Analyzer, AC Arc Flash Analysis & Result Analyzer, Harmonics Studies & Filter Sizing, Motor Acceleration Studies.

UNIT V PSCAD **6**

Applications of PSCAD in Power Systems including Switching & Lightning Induced Transients for Insulation Coordination Transient Studies-Configuring Transmission Lines with PSCAD-Distributed Generation & Power Quality

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. Modern distribution systems with PSCAD analysis, Yazdani, Atousa, CRC Press,2018, ISBN 10: 1315301504
5. SKM, ETAP, & EDSA Power System Analysis Tutorials, Stephen Philip Tubbs, Stephen P. Tubbs, 2009,
6. Power systems analysis illustrated with MATLAB and ETAP,Madhusudan,
7. Shertukde , Hemchandra, 2019, ISBN 10:0429792425

ONLINE RESOURCES

1. https://www.youtube.com/watch?v=k94A5cbmDes
2. https://www.youtube.com/watch?v=HD1sbM_QXgc

WEB RESOURCES

1. https://www.pscad.com/knowledge-base/download/ pscad_manual_v4_6.pdf
2. https://etap.com/docs/default-source/qa-documentation/etap-getting-started.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 code organization and functional hierarchical decomposition with complex data types. (K5)
5. Apply working knowledge of ETAP to simulate and solve Power System Applications. (K3)
6. Develop the knowledge of Power System based design using PSCAD . (K6)

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...

Sai Prakash Leo Muthu

CEO – Sairam Institutions

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through Quality education.

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