K.L.N. COLLEGE OF ENGINEERING

Pottapalayam-630612, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University, Chennai)

Estd: 1994

FIRST & SECOND YEAR

CURRICULAM AND SYLLABI

REGULATION 2020

For Under Graduate Program

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2020-2021 onwards)

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM
(An Autonomous Institution, Affiliated to Anna University, Chennai)

VISION OF THE INSTITUTION

TobecomeaCentreofExcellenceinTechnicalEducationandResearchinproducingCompetent and ethical professionalstothesociety.

MISSION OF THE INSTITUTION

ToimpartValueandNeedbasedcurriculumtothestudentswithenrichedskilldevelopment in the field of Engineering, Technology, Management and Entrepreneurshipand to nurture their character with social concern and to pursue their career in the areas ofResearch andIndustry**.**

VISION OF THE DEPARTMENT

To promote as a center of excellence in educational and research activities related to electronics and communication engineering and its allied areas.

MISSION OF THE DEPARTMENT

- To create educational and research environment to meet ever changing and ever demanding needs of electronics and communication industry along with IT and other interdisciplinary fields.
- To mould the students to become ethically upright and recognized as responsible engineers.

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1 To prepare graduates with a strong foundation in Engineering science and Technology with more emphasis in Electronics and Communication Engineering and its allied areas.

PEO2 To prepare the students to pursue successful career in industry and to motivate them for higher education.

PEO3 To prepare the graduates to sustain as good professional, researcher and to practice them in emerging technologies through lifelong learning.

PEO4 To impart students with ethical standards, professional excellence through effective communication skills, team work, multi-disciplinary projects and social responsibility.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1 Design and analyse the basic analog and digital electronic circuits.

PSO2 Design and analyse the spectral components of communication signals and systems.

PSO3 Develop the modules in VLSI and embedded systems.

PO1: Engineering knowledge

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

PO2: Problem analysis

Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions

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

PO4: Conduct investigations of complex problems

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6:The engineer and society

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

PO7: Environment and sustainability

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

PO8: Ethics

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication

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

PO11: Project management and finance

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

PO12:Life-long learning

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

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REGULATIONS 2020

For Under Graduate Program

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM

CATEGORY OF COURSES

i. **Humanities and Social Sciences (HS)Courses** include Technical English, Environmental Science and Engineering, Engineering Ethics and human values, Communication Skills and Management courses.

ii. **Basic Sciences (BS) Courses** include Mathematics, Physics, and Chemistry.

iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.

iv. **Professional Core (PC)Courses** include the core courses relevant to the chosen programme of study.

v. **Professional Elective (PE)Courses** include the elective courses relevant to the chosen programme of study.

vi. **Open Elective (OE) Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. / B.Tech. Programmes.

vii. **Employability Enhancement Courses (EEC)** include Project Work and/or Internship, Seminar,Professional Practices, Case Study and Industrial/Practical Training.

viii. **Mandatory (MC) Courses** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc

SEMESTER I

(Common to all B.E/B.TechProgrammes)

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
		THEORY						
1	20HS101	English for Technical Communication	HS	3	3	0	0	3
2	20BS101	Fundamentals of Engineering Mathematics	BS	4	3	1	0	4
3	20BS102	Engineering Physics	BS	3	3	0	0	3
4	20BS103	Engineering Chemistry	BS	3	3	0	0	3
5	20GE101	Problem Solving using Python Programming	ES	3	3	0	0	3
		PRACTICAL						
6	20BS1L1	Basic Science Laboratory	BS	3	0	0	3	1.5
7	20GE1L1	Python Programming Laboratory	ES	4	0	0	4	2
8	20GE1L2	Industrial Practices Workshop	ES	3	0	0	3	1.5
TOTAL				**26**	**15**	**1**	**10**	**21**

SEMESTER II

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
		THEORY						
1	20HS201	Advanced Technical Communication **(Common to all B.E./B.Techprogrammes)**	HS	3	3	0	0	3
2	20BS201	Laplace Transform and Advanced Calculus **(Common to all B.E/B.Techprogrammes)**	BS	4	3	1	0	4
3	20BS203	Physics for Electronics Engineering **(Common to B.E. EEE, B.E. ECE and B.E. EIE programmes)**	BS	3	3	0	0	3
4	20EC201	Network Analysis	PC	4	3	1	0	4
5	20GE201	Engineering Graphics **(Common to all B.E./B.Techprogrammes)**	ES	4	2	0	2	3
6	20GE204	Basic Electrical Engineering and Electron Devices	ES	3	3	0	0	3
		PRACTICAL						
7	20EC2L1	Circuits and Devices Laboratory	PC	4	0	0	4	2
8	20GE2L2	Unix and Shell Scripting Laboratory	ES	3	1	0	2	2
TOTAL				**28**	**18**	**2**	**8**	**24**

SEMESTER III

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20BS302	Linear Algebra and Partial Differential Equations	BS	4	3	1	0	4
2.	20EC301	Analog Circuits	PC	3	3	0	0	3
3.	20EC302	Signals and Systems	PC	4	3	1	0	4
4.	20EC303	Digital System Design	PC	4	3	1	0	4
5.	20HS301	Universal Human Values **(Common to all B.E./B.Techprogrammes)**	HS	3	2	1	0	3
THEORY CUM PRACTICAL								
6.	20CS303	Object Oriented Programming and Data Structures	ES	5	3	0	2	4
PRACTICAL								
7.	20EC3L1	Analog Circuits Laboratory	PC	3	0	0	3	1.5
8.	20EC3L2	Digital System Design Laboratory	PC	3	0	0	3	1.5
TOTAL				**29**	**17**	**4**	**8**	**25**

SEMESTER IV

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	20EC401	Random Process and Information Theory	PC	3	3	0	0	3
2.	20EC402	Computer Architecture and Organization	PC	3	3	0	0	3
3.	20EC403	Electromagnetic Fields	PC	4	3	1	0	4
4.	20EC404	Analog Electronics and Integrated Circuits	PC	3	3	0	0	3
5.	20HS401	Environmental Science and Engineering **(Common to all B.E./B.Techprogrammes)**	HS	2	2	0	0	2
THEORY CUM PRACTICAL								
6.	20EC405	Principles of Digital Signal Processing	PC	5	2	1	2	4
PRACTICAL								
7.	20EC4L1	Analog Integrated Circuits Laboratory	PC	3	0	0	3	1.5
8.	20HS4L1	Professional Communication and Technical presentation	EEC	3	0	0	3	1.5
TOTAL				**26**	**16**	**2**	**8**	**22**

20HS101	ENGLISH FOR TECHNICAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- This course is designed for entry level Engineering and Technology curriculum enabling the students to learn, acquire and apply for their learning and career.
- The course is aimed at providing effective skills for promoting communication skills through English.
- Students will benefit in conversing with the peers, faculty and fellow professionals.
- The outcome of this course contains refined level of English proficiency by acquiring all four skills, listening, speaking, reading and writing to prepare them for global readiness.

PRE-REQUISITE: NIL

UNIT-I FOCUSING LANGUAGE DEVELOPMENT 9

Listening: Listening to TV News, Guest Lecturers, Note – taking. **Speaking**: Pronunciation Common Vocabulary – Technical Vocabulary – Answering Peer Questions – Conversation with Teacher. **Reading**: News magazines, Reading for unfamiliar words, Variety of News Items

Writing: Word formation – Auxiliary verbs – Modal Verbs – Sentence Types – Affirmative, Negative, Interrogative, Concord – Dialogue Writing, Letter to Principal / Director – Instructions using Auxiliary

UNIT-II GRAMMAR AND TECHNICAL READING 9

Listening: Listening to Peer Conversations – Brief Speeches – Listening for Specific Information – Recap of Speeches. **Speaking**: Wh Questions, Day today conversations, Telephonic enquiries official/formal enquiries. **Reading**: Technical Essays – Identifying Sentence Types – Classifying the verb patterns. **Writing**: Tenses – Simple Present, Present Progressive, Present Perfect, Present Perfect Continuous – Voice – Active & Passive – Précis Writing – Essay Writing

UNIT - III GRAMMAR AND LANGUAGE DEVELOPMENT 9

Listening: TV interviews, Commentaries, Digital Videos for World Information. **Speaking**: Telephonic Conversation – Classroom Activities – Conversing Information.**Reading**: Coherence, Development of Thoughts. **Writing**: Tenses – Simple Past, Past Progressive, Past Perfect, Past perfect continuous – Impersonal Passive-Narrating the past events, Letter to friend/father about Industrial Visit/Functions held – Narrating the past experience using Impersonal Passive voice

UNIT - IV READING AND LANGUAGE DEVELOPMENT 9

Listening: Listening to Dialects of English – British & American Regional. **Speaking**: Role Plays, Extempore, Responding to specific questions. **Reading**: Comprehensive passages, Reading for specific points. **Writing**: Tenses – Simple Future, Future progressive, Future Perfect, Future Perfect continuous – Definition – Phrases of Reason – Cause & Effect, Recommendations, Argumentative Essays, Letter to the Editor on Social Issues – Analytical Essays on Social hazards using Cause and Effect.

UNIT - V EXTENDED WRITING 9

Listening: Listening to Technical Seminar speeches – Listening to achievers, eminent personalities – Dialects – Australian – African – Asian. **Speaking**: Welcome address, Compeering, Vote of Thanks, Peer debates. **Reading**: Texts on self-confidence, motivation, success path. **Writing**: Contracted forms, Conditionals, Articles, Preposition, Tense – 'going to' - Error Spotting, Sequence Words – Rearranging – Writing a Book Review – Summary writing – Rearranging Sentences using Sequence Words, Note Making

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Listen, Comprehend and Correspond with others at various contexts
- Speak legibly and fluently under various life-time situations by applying proper communication modules.
- Read and understand a variety of writings and technical text by analyzing the meaning and language.
- Apply clear and legible writing skills in error free style in coherent manner
- Remember and use various communicative skills in precise and efficient way on technological contexts
- Form situational conversations and technical writing styles for interpersonal and effective communication

TEXT BOOKS:

1. Board of Editors. "Using EnglishA Course book for Undergraduate Engineers and Technologists". Orient Black Swan Limited, Hyderabad: 2015
2. Richards, C. Jack. "Interchange Students' Book-2", New Delhi: CUP, 2015.

REFERENCES:

1. Murphy, Raymond "English Grammar in Use with Answers: Reference and Practice for Intermediate Students", Cambridge: CUP, 2004
2. Thomson, A.J. and Martinet, A.V. "A Practical English Grammar", OUP, New Delhi: 1986
   Anne Laws, "Writing Skills", Orient Black Swan, Hyderabad, 2011
3. Board of Editor, "English for Technical Communication", Great Mind Publication, Chennai : 2018

20BS101 FUNDAMENTALS OF ENGINEERING MATHEMATICS

L	T	P	C
3	1	0	4

OBJECTIVES:

- To relate various methods of Matrix Algebra to handle practical problems arising in the field of engineering.
- The main aim of this course is to achieve conceptual understanding and to retain the best traditions of Calculus.
- The syllabus is designed to provide the basic tools of Calculus of Single and Multivariable, mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions.

PRE-REQUISITE: NIL

UNIT-I MATRICES **12**

Introduction to Matrices-Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a Quadratic form to Canonical form by Orthogonal transformation – Nature of Quadratic forms.

UNIT - II DIFFERENTIAL CALCULUS **12**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Differentiation of Polynomials, Exponential, Trigonometric, Hyperbolic, Logarithmic and Implicit functions- Maxima and Minima of functions of single variable.

UNIT – III FUNCTIONS OF SEVERAL VARIABLES **12**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT – IV INTEGRAL CALCULUS **12**

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

UNIT – V ORDINARY DIFFERENTIAL EQUATIONS **12**

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Find the Eigen values and Eigen vectors to diagonalize a matrix, reduce quadratic form to canonical form.
- Apply the concept of limits, continuity and rules of differentiation to differentiate some standard functions and apply the techniques of differentiation to differentiate various types of functions.
- Understand the concepts of Concavity and Convexity by finding the Critical points, point of Inflection and to find Maxima and Minima functions of Single variable.
- Find the derivatives of functions of two variables and apply them to calculate the maxima and minima.
- Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
- Apply various techniques to solve higher order differential equations with constant and variable coefficients.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan., "Engineering Mathematics I", The Tata Mc Graw Hill Publication-New Delhi, First Edition, 2018

REFERENCES:

1. James Stewart, "Calculus, Early Transcendental", Cengage Learning, 7th Edition, New Delhi, 2015. [For units II & III].
2. 2. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2006.
3. Wiley, "Calculus- International Student version", 10thEdition, Wiley India Pvt. Ltd, New Delhi 2017.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", NarosaPublications,New Delhi, 5th Edition , 2016.
5. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics II", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 9thEdition, 2014.

20BS102	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To inculcate the fundamental knowledge in properties of matter and crystal physics.
- To enrich the knowledge on Laser, fiber optics and ultrasonics and their applications relevant to various streams of Engineering andTechnology.
- To introduce quantum physics and its applications.

PRE-REQUISITE: NIL

UNIT - I PROPERTIESOFMATTER **9**

Elasticity – Hooke's Law – Stress-strain diagram and its uses – Three modulus of elasticity (qualitative) – Poisson's ratio – factors affecting elastic modulus and tensile strength – twisting couple – torsional pendulum: theory and experiment – bending of beams – bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment – **I** -shaped girders.

UNIT - II LASER ANDFIBEROPTICS **9**

Lasers: Interaction of radiation with atomic energy states – Einstein's A and B coefficients derivation – Population inversion – resonant cavity, optical amplification (qualitative) – solid statelasers – Nd:YAG 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 optic sensors: pressure and displacement sensor.

UNIT - III ULTRASONICS **9**

Ultrasonics – classification (qualitative) – properties – generation – magnetostriction and piezoelectric methods – detection of ultrasound – cavitations – velocity measurement – acoustic grating – Industrial applications (Drilling, Welding, Soldering and Cleaning) – SONAR – NDT – Pulse Echo system through Transmission and Reflection modes – A, B and C scan displays - Medical application – sonogram.

UNIT - IV QUANTUMPHYSICS **9**

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunneling (qualitative) – scanning tunneling microscope.

UNIT - V CRYSTALPHYSICS **9**

Crystalline and amorphous materials – unit cell, crystal systems, Bravais lattices, lattice planes - Miller indices – Inter planar spacing in cubic lattice – coordination number and packing factor for SC, BCC, FCC, HCP structures – growth of single crystals: solution and melt growth techniques – Mechanisms of plastic deformation, slip and twinning.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Demonstrate the properties of elasticity and measure the different moduli of elasticity.
- Examine the characteristics of laser and optical fiber
- Apply the concepts of ultrasonics in engineering
- Explain black body radiation, properties of matter waves and Schrodinger equation
- Classify the Bravais lattices and different types of crystal structures
- Gain information on growth of crystals and deformations

TEXT BOOKS:

1. R. K. Gaur and S. L. Gupta, “Engineering Physics”, Dhanpat Rai Publications, 2012.
2. B. K. Pandey and S. Chaturvedi, “Engineering Physics”, Cengage Learning India, 2018.
3. V.Rajendran, “Engineering Physics”, Tata McGraw Hill Education Private Limited, 2011.

REFERENCES:

1. D.Halliday, R. Resnick and J. Walker, “Principles of Physics”, Wiley publisher, 10th Edition, 2015.
2. R.A.Serway and J.W. Jewett, “Physics for Scientists and Engineers”, Cengage Learning, 2014.
3. P.A.Tipler and G. Mosca, “Physics for Scientists and Engineers with Modern Physics”, W.H.Freeman, 2007.
4. D.K.Bhattacharya and T. Poonam, “Engineering Physics”, Oxford University Press, 2017.

20BS103 ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make the students, familiar with boiler feed water requirements, related problems and water treatment techniques.
- To learn the principle of electrochemical cell, types of corrosion and its control.
- To develop an understanding of the basic concepts of phase rule and its applications to one and two component systems and appreciate the purpose and significance of alloys.
- To be familiar with different types of fuel and their characteristics and also functioning of energy storage devices.
- To understand the techniques of spectra and chromatography for analytical purpose.

PRE-REQUISITE: NIL

UNIT - I WATER AND ITS TREATMENT 9

Characteristics of water; Hard water, Soft water, difference; Hardness – types of hardness, expression of hardness, units, removal of hardness (boiling, soda lime process), estimation of hardness of water by EDTA method (problems); Boiler feed water – requirements – disadvantages of using hard water in boilers (scale and sludge, priming and foaming, caustic embrittlement, boiler corrosion); Treatment of boiler feed water – internal treatment (carbonate, phosphate, and calgon conditioning) external treatment – ion exchange process, zeolite process**;** Purification of water- reverseosmosis, electro dialysis, Application of nanomaterials in water purification.

UNIT - II ELECTROCHEMISTRY AND CORROSION 9

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation potential- reduction potential, - electrochemical series and its significance - Nernst equation (derivation and problems).

Corrosion- causes- factors, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method **–** corrosion inhibitors. Metallic coating – Electroplating – Factors - Electroplating of Copper and Electroless plating of Nickel.

UNIT - III PHASE RULE AND ALLOYS 9

Phase rule - introduction, definition of terms with examples; One component system - water system; Reduced phase rule - two component system, classification, lead-silver system; Alloys – introduction, definition, properties of alloys, significance of alloying; Functions and effects of alloying elements; Heat treatment of steel - annealing, hardening, tempering, carburizing, nitriding; Ferrous alloys- nichrome and stainless steel (18/8); Non-ferrous alloys – brass and bronze.

UNIT - IV FUELS AND BATTERIES 9

Fuels – classification, characteristics; Petrol – characteristics, knocking, octane number; Diesel – characteristics, cetane number; Natural gas (CNG), LPG, Power alcohol, Biodiesel, Gasohol; Combustion of fuels – calorific value, GCV and NCV (Problems),calculationoftheoretical air for combustion (Problems), Ignition temperature, explosive range, flue gas analysis (Orsatapparatus);

Batteries – primary and secondary batteries, lead-acid battery, lithium ion battery, Fuel cell (hydrogen oxygen fuel cell).

UNIT - V ANALYTICAL TECHNIQUES 9

Spectroscopic techniques – UV-visible(Principle and Instrumentation – Block Diagram only and applications), IR(Principle and Instrumentation – Block Diagram only and applications), ^{1}H NMR ((Principle and Instrumentation – Block Diagram only) – Chromatography – HPLC - Flame photometry – Estimation of sodium by Flame photometry.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Identify the problems of hardness of water in boilers and to treat water by various methods.
- Construct electrochemical cell and apply Nernst equation for an electrochemical cell and identify various methods to controlcorrosion.
- Analyse the phase diagram of one component and two component system and describe the various methods of heat treatment ofsteel.
- Categorise the various types of fuels by their characteristics and analyse the flue gas by Orsat'smethod.
- Illustrate the working of lead acid battery, lithium ionbattery and fuelcell.
- Describe the instrumentation and working of UV, IR, ^{1}HNMR, HPLC, and flame photometry.

TEXT BOOKS:

1. P.C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2017
2. S.S Dara and S.S Umare, "A Text Book of Engineering Chemistry", S.Chand& Company Limited, 20th Edition, 2018.

REFERENCES:

1. Shashi Chawla, "A Textbook of Engineering Chemistry", Dhanpat Rai & CO. (PVT) LTD, New Delhi, 2012.
2. B.R. Puri, L.R. Sharma, M.S. Pathania, Vishal, "Principles of Physical Chemistry", Vishal Publishing Co., Punjab, 47th Edition, 2017.
3. G Palanna, "Engineering Chemistry", McGraw Hill Education (India) PVT, LTD, Chennai, 2017.
4. Dr. Sunita Rattan, "A Textbook of Engineering Chemistry", S.K.Kataria& Sons, New Delhi, 2012.

20GE101	PROBLEM SOLVING USING PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To know the basics of Computers and algorithmic problem solving
- To understand Python programs with conditional and looping constructs.
- To define Python functions and strings.
- To use Python data structures – lists, tuples, sets and dictionaries.
- To do input/output with files in Python.

PRE-REQUISITE: NIL

UNIT-I COMPUTER FUNDAMENTALS AND PROBLEM SOLVING 9

Introduction to Computer System – Block Diagram of Computer, Types of Memory, I/O Devices, Application Programs, System Programs – Loader, linker, assembler, compiler, interpreter, Programming process – source code to executable code, Problem Solving Strategies – Problem analysis, Algorithms, Flow Charts, Pseudo Code. Illustrative problems: odd or even number, Leap year, Biggest of three numbers, square root of a number, Sum of n numbers, Armstrong number, Palindrome, Fibonacci Series, Prime number, Bubble Sort and Linear Search.

UNIT-II DATA, EXPRESSIONS, CONTROL FLOW STATEMENTS 9

Python interpreter and interactive mode, values and types – int, float, boolean, string, and list, variables, expressions, statements, tuple assignment, operators and precedence of operators, comments, Control Flow Statements – Conditionals – conditional (if), alternative (if-else), chained conditional (if-elif-else), Iteration – state, while, for, break, continue, pass, Illustrative programs – exchange the values with and without using temporary variables, circulate the values of n variables, distance between two points.

UNIT - III FUNCTIONS, STRINGS 9

Functions – function definition and use, flow of execution, parameters and arguments, function composition, Fruitful functions – return values, parameters, local and global scope, recursion, Strings – string slices, immutability, string functions and methods, string module, Illustrative programs – square root, GCD, exponentiation, Factorial of a number, linear search, binary search.

UNIT - IV LISTS, TUPLES, SETS, DICTIONARIES 9

Lists – list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, Lists as arrays, Tuples – tuple assignment, tuple as return value, Sets - Creating a set, Modifying a set, Removing elements from a set, Set operations- Set Union, Set intersection, Set difference, Set membership test, Iterating through a set, Set methods, Built-in functions with set, Frozenset - Dictionaries – operations and methods, Advanced list processing –List comprehension, Illustrative programs – selection sort, insertion sort, Matrix addition and subtraction, sum an array of numbers.

UNIT - V FILES, MODULES, PACKAGES 9

Files and exception – text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages – Math and Rand, Illustrative programs – word count, copy file, merge two files.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Explain Components of a Computer System, types of programming languages, types of software with examples and purpose.
- Perform problem analysis, use algorithms and prepare flow charts, pseudo code for solving simple problems.
- Use Conditional, iteration constructs of python programming and apply to solve simple problems.
- Use Functions, recursive function, String functions in python programming and apply to perform linear and binary search.
- Explain the various operations for manipulating Tuples, Sets, Dictionaries and Use List to perform simple and sorting operations.
- Explain file handling operations, exception handling, modules and packages and illustrate programs for word count, file copy, merge operations and exception handling.

TEXT BOOKS:

1. E. Balagurusamy, “Problem solving and Python Programming”, First edition, McGraw Hill Education (India) Private Limited, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

REFERENCES:

1. YashavantKanetkar, Aditya Kanetkar, “Let Us Python”, 2nd Edition, BPB Publications, 2020.
2. John V Guttag, “Introduction to Computation and Programming Using Python: With Application to Understanding Data”, 2nd Edition, PHI Publisher,2017.
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. Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3.6”, 3rdedition, Shroff/O’ Reilly Publishers,2018.
6. Dr.A.Kannan,Dr.L.SaiRamesh,“ProblemSolvingandPythonProgramming”,UpdatedEdition, United Global Publishers Pvt. Ltd., April 2018.

20BS1L1 BASIC SCIENCE LABORATORY

L	T	P	C
0	0	3	1.5

PHYSICS LABORATORY

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in Optics, properties of matter and liquids.

PRE-REQUISITE: NIL

LIST OF EXPERIMENTS
(Any five to be carried out & one demonstration experiment)

1. Determination of Rigidity modulus – Torsional Pendulum.
2. Determination of Young's modulus – Non Uniform Bending.
3. a. Determination of wavelength and particle size using diode laser.

b. Determination of acceptance angle in an optical fiber.

4. Determination of velocity of sound and compressibility of liquid using ultrasonic interferometer.
5. Determination of band gap of a semiconductor diode.
6. Determination of thickness of a thin wire – Air wedge method.
7. Determination of dispersive power of a prism – Spectrometer*
8. Determination of wavelength of mercury spectrum – Spectrometer grating

*Demonstration experiment

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Evaluate moment of inertia of adisc and rigidity modulus for thin wire using Torsionalpendulum
- Appraise Young's modulus of material of the given beam by Non-Uniform bending method
- Measure the wavelength of laser light, Particle size and basic parameter of optical fiber using Semiconductor diode LASER
- Estimate velocity of ultrasound and compressibility of liquid
- Estimate the wavelength of the prominent spectral lines
- Utilize experiment kits for useful applications

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Torsional pendulum set	6
2	Travelling microscope & accessories	6
3	Laser kit	6
4	Ultrasonic interferometer	6
5	Semiconductor band gap kit	6
6	Air wedge set up	6
7	Spectrometer & prism	6
8	Spectrometer & Grating	6

CHEMISTRY LABORATORY

OBJECTIVES:

- To make the students to acquire practical skill in the determination of water quality parameters through volumetricanalysis.
- To have hands on experience in using instruments like pH meter, conductivitymeter,potentiometer.
- To acquaint the students with the determination of molecular weight of polymer by viscometer.

PRE-REQUISITE: NIL

Any Five experiments to be given

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of dissolved oxygen content of water sample by Winkler's method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Estimation of iron content of the given solution using potentiometer.
6. Conductometric titration of a strong acid Vs a strong base.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Corrosion Experiment – Weight Loss Method.
10. Estimation of sodium present in water using flame photometer.

TOTAL(Physics & Chemistry): 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Estimate the Chemical quality parameter of a water sample.
- Estimate the strength of acid by conductometric and pH metric titration.
- Estimate the strength of oxidisable material present in given sample by potentiometry.
- Determine the molecular weight of polymer by Ostwald viscometer.
- Demonstrate the rate of corrosion by weight loss method.

REFERENCE:

1. Vogel's "Text book of quantitative chemical analysis" (8^{th} edition, 2014)

LIST OF APPARATUS AND EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Burette	30
2	Pipette	30
3	Beaker (100ml)	30
4	Conical Flask (250ml)	30
5	Conductivity meter	10
6	Potentiometer	10
7	pH meter	10
8	Viscometer	10
9	Flame Photometer	1
10	Electronic Balance	1

20GE1L1	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To write, test, and debug simple Python programs using conditional statements.
- To implement Python programs using loops.
- To use functions for structuring Python programs.
- To implement Python programs using lists.
- To write Python programs for implementing file operations.

PRE-REQUISITE: NIL

LIST OF PROGRAMS

1. Biggest of three numbers, odd or even number, Leap year.
2. GCD, Armstrong Number, Palindrome, Fibonacci Series, Prime number
3. Find the square root and exponentiation of a number with and without built-in functions
4. Linear search and Binary search using Recursion.
5. Find the maximum of a list of numbers
6. Selection sort, Insertion sort
7. First n prime numbers
8. Transpose of a Matrix
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Merge two files

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Develop simple Python programs using conditional and iterative constructs.
- Develop simple Python programs using built-in functions and user-defined functions.
- Develop a Python program using recursion to implement linear and binary search.
- Develop a Python program using list to implement selection and insertion sort.
- Develop Python programs to implement matrix operations.
- Develop a Python program to implement file handling.

20GE1L2	INDUSTRIAL PRACTICES WORKSHOP	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To provide exposure to the students with Hands on Experience on various Basic Industrial Practices in Civil, Mechanical, Electrical and Electronics Engineering.

PRE-REQUISITE: NIL

GROUP A (CIVIL & MECHANICAL)
LIST OF EXPERIMENTS

I CIVIL ENGINEERING PRACTICE

UNIT-I CARPENTRY PRACTICE

1. Study of carpentry tools.
2. Preparation of Cross lap joint
3. Preparation of Dovetail joint
4. Preparation of T joint

UNIT-II PLUMBING PRACTICE

1. Study of plumbing tools, pipeline joints, its location and functions: valves, taps, couplings, unions, reducers and elbows in household fittings.
2. Exercise on Preparation of plumbing line sketches for water supply and sewage works.
3. Exercise on providing of basic water line connection for a residential house using plumbing components.
4. Exercise on providing Water line pipe connections for household utilities like water heater, wash basin etc.,

II MECHANICAL ENGINEERING PRACTICE

UNIT - III SHEET METAL PRACTICE

1. Study of sheet metal forming tools.
2. Preparation of a Model of rectangular tray.
3. Preparation of a Model of Conical Funnel.

UNIT - IV MACHINING PRACTICE

1. Study of machining tools.
2. Exercise on Simple turning, Facing, Chamfering
3. Exercise on Taper turning.
4. Exercise on Drilling and Tapping.

UNIT – V METAL JOINING PROCESS

1. Study of welding tools.
2. Exercise to join two metal plates by single butt joint using arc welding.
3. Exercise to join two metal plates by T Fillet joint using arc welding.
4. Exercise to join two metal plates by lap joint using arc welding.

DEMONSTRATION

1. Gas welding process.
2. Refrigeration and Air conditioning process.

GROUP B (ELECTRICAL & ELECTRONICS)
LIST OF EXPERIMENTS

I ELECTRICAL ENGINEERINGPRACTICE

1. Residential house wiring using switches, fuse, indicator, Fluorescent lamp and Energy Meter.
2. Measurement of Power consumption for CFL, Fluorescent Lamp, LEDLamp and Incandescent lamp.
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 an electrical equipment.

II ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components – Resistor colour coding, Capacitor, Inductor-Measurement using LCR meter, Transistor &Diode – Terminal identification using Multimeter.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Measurement of AC signal parameter (peak-peak, rms value, period & frequency) using CRO and AFO.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS		
CIVIL		
S. No	**Component Name**	**No. of Components**
1	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, coupling, unions, elbows, plugs and other fittings	15 sets
2	Carpentry Vice (fitted to work bench)	15 nos
3	Standard wood working tools	15 sets
4	Models of industrial trusses, door joints, furniture joints	5 each
5	Power Tools a. Rotary Hammer b. Demolition Hammer c. Circular Saw d. Planer e. Hand Drilling Machine f. Jigsaw	 2 nos 2 nos 2 nos 2 nos 2 nos 2 nos

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	Power Tool: Angle Grinder	2 nos
7	Study purpose items: Refrigerator and Air Conditioner	One each
ELECTRICAL		
1	Assorted electrical components for house wiring	10 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 a. Range Finder b. Digital Live-wire detector	 2 nos 2 nos
ELECTRONICS		
1	Soldering guns	10 nos
2	Assorted electronic components for making circuits	50 nos
3	Small PCBs	10 nos
4	Multimeters	10 nos
5	Regulated of power supply, CRO	1 no. each

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Prepare different carpentry joints.
- Prepare pipe connections with different joints for domestic applications.
- Make the models using sheet metal works.
- Carry out the basic machining operations.
- Prepare joints using welding equipment's.
- Demonstrate on gas welding, refrigeration and air conditioning processes.
- Carry out basic home electrical works and appliances.
- Measure the electrical quantities.
- Elaborate on the components, gates, soldering practices.

20HS201	ADVANCED TECHNICAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- This course is designed for Engineering and Technology curriculum enabling the students to learn, acquire and apply updated elements of English communication.
- The course is aimed at providing effective skills for procuring communication skills for business and advanced technology.
- Students will benefit by learning the four skills – Listening, Speaking, Reading and Writing – to meet the global requirements for their career and higher studies.

PRE-REQUISITE: NIL

UNIT-I TECHNICAL WRITING 9

Listening: Listening to audio-visuals on personal Interviews, Speeches from Company CEOs, TV Debates. **Speaking**: Wishing, Greeting, Enquiring Hobbies. **Reading**: Editorials, Letter to the Editor Columns, Technical Papers. **Writing**: Analytical writings, Emphasis Techniques, Letter Writing – Business Correspondence, Abstract Writing, Common Errors, Footnotes, Compound words, Preparation of Agenda

UNIT-II BUSINESS ENGLISH AND LANGUAGE DEVELOPMENT 9

Listening: Listening to Audio-Visual documentary, TV Programs of Celebrities Forum. **Speaking**: Self-Expression, Introducing the fellow students, Talking about celebrities, leaders

Reading: Company Correspondence, Business Correspondence, Technical Text for Vocabulary

Writing: Bibliography, Sentence Completion, Cloze exercises, Verbal Analogy, Letter – Business enquiry orders, payments, Minutes Preparation.

UNIT - III VISUAL BASED LANGUAGE DEVELOPMENT 9

Listening: Visuals on Group Discussion-Understanding the nuances of GD – Approach – Content – Methodology. **Speaking**: Discussing main points on burning issues, Social issues – Expressing ideas and suggestions. **Reading**: Etiquettes of Non-Verbal Communication. **Writing**: List of common expressions for specified situations – Sentence linkers – Formal Expressions – Suggestions – Reported Speech - Letter to the Editor on Common Issues – Writing the Points in Indirect Form – Check Lists – Numerical Expression

UNIT - IV EMPLOYABILITY CORRESPONDENCE 9

Listening: Listening to Visuals of Technical Paper presentation – Technical and HR interviews

Speaking: Peer-to-Peer Interview – Mock Interview – Telephone Conversations. **Reading**: Comparative Analyses – Instructions on Public Spots – Time Management concepts – Email Correspondence. **Writing**: Compare and Contrast – Cause and Effect – Purpose and Function – Job Application Letter – Drafting Resume / CV,– Inferring the graphical / Pictorial representations – Bar chart – Pie chart, Instruction – common and technical instructions for a process or a component.

UNIT - V TECHNICAL REPORT WRITING 9

Listening: Key note speeches – Annual Reports of institutions / companies. **Speaking**: Answering to the Mock Panel Interview – Sharing of interview experiences – presenting a Technical Paper. **Reading**: Annual Reports – Company Reports – Newspaper reports – Comprehension passages. **Writing**: Homophones – Abbreviations and Acronyms – SI Units – Report Writing with recommendations – Inferring the Graph – Flow Chart – Tables – Technical Papers

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Listen, Understand and create technical correspondence at advanced level
- Respond or answer to the contextual questions, interview questions, form instructions, draft reports
- Speak and analyze social issues, come out with effective ideas for discussion, understand the passages for meaning and vocabulary
- Assess error free technical writings, create legible and coherent technical papers, derive ideas of the given texts in a precise form
- Remember the updated elements of communication skills, nuances of non-verbal communication, business communication
- Create technical instructions, process instructions, self-appraisals, Resumes, reports on various situations

TEXT BOOKS:

1. Board of editors. “Fluency in English A Course book for Engineering and Technology”. Orient Blackswan, Hyderabad: 2016
2. Raman, Meenakshi and Sharma, “Sangeetha- Technical Communication Principles and Practice”.Oxford University Press: New Delhi,2014.

REFERENCES:

1. Booth-L. Diana, “Project Work”, Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, “English for Presentations”, Oxford University Press, Oxford: 2007
3. Means, L. Thomas and Elaine Langlois, “English & Communication For Colleges. Cengage Learning”, USA: 2007
4. Board of Editor, “Advanced Technical Communication”, Great Mind Publication, Chennai : 2019

20BS201	LAPLACE TRANSFORM AND ADVANCED CALCULUS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To make the student familiar with topics such as Multiple Integrals, Vector Calculus, Analytic Functions,Complex Integration and Laplace Transform.
- To learn the concept of basic Vector Calculus which can be widely used for Modeling the various laws of Physics.
- To understand the various methods of Complex Analysis and Laplace Transform can be used for efficiently solving the problems that occur in various branches of Engineering disciplines.

PRE-REQUISITE: NIL

UNIT - I 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 – Inverse Transforms – Convolution Theorem – Transform of Periodic Functions – Application to Solution of Linear Second Order Ordinary Differential Equations with Constant Coefficients.

UNIT-II 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-III VECTOR CALCULUS 12

Gradient and Directional Derivative – Divergence and Curl - Vector Identities – Irrotational and Solenoidal Vector fields – Line Integral over a Plane curve – Surface Integral - Area of a Curved Surface - Volume Integral – Green's, Gauss divergence and Stoke's theorems – Verification and Application in evaluating Line, Surface and Volume Integrals.

UNIT - IV ANALYTIC FUNCTIONS 12

Analytic functions – Necessary and Sufficient Conditions for Analyticity in Cartesian and Polar Coordinates – Properties – Harmonic Conjugates – Construction of Analytic Function – Conformal Mapping – Mapping by Functions w = z+c, cz, 1/z , z2 -Bilinear transformation.

UNIT - V COMPLEX INTEGRATION 12

Line integral – Cauchy's Integral Theorem – Cauchy's Integral Formula – Taylor's and Laurent's Series – Singularities – Residues – Residue Theorem – Application of Residue Theorem for Evaluation of Real Integrals – Use of Circular Contour.

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Understand the properties of Laplace transforms and to find the Laplace transform of some standard functions.
- Apply Laplace transform and inverse transform to solve the initial value problems.
- Solve the multiple integrals and apply the concept to find areas, volumes.
- Evaluation of line, surface and volume integrals using Green's, Gauss and Stokes theorems.
- Determine Analytic functions, Bilinear Transformations and apply the concept of conformal mapping to find the images of given curves.
- Evaluation of Contour Integrals using Cauchy's Integral and Residue theorems.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan., "Engineering Mathematics I", The Tata Mc Graw Hill Publication-New Delhi, FirstEdition2018.

REFERENCES:

1.Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 9thEdition, NewDelhi, 2006.
2. James Stewart, "Calculus, Early Transcendental", Cengage Learning, 7th Edition, New Delhi, 2015.
3.Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics II", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 9th Edition, 2014.
4.Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics II", Narosa Publications, New Delhi, 5thEdition, 2016.
5. Sastry, S.S. "Engineering Mathematics", Vol.I& II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.

20BS203 PHYSICS FOR ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the essential physics of semiconductor device and electron transport properties.
- To inculcate proficiency in dielectric and optical properties of materials.
- To develop the knowledge on nano electronic devices.

PRE-REQUISITE: NIL

UNIT - I ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory: Derivation of electrical conductivity and Thermal conductivity – Wiedemann-Franz law – Success and failures – Quantum free electron theory: Fermi–Dirac statistics – Density of energy states – Electron in periodic potential (Zone theory): Bloch theorem – Energy bands in solids – metals and insulators – tight binding approximation – Electron effective mass – concept of hole.

UNIT - II SEMICONDUCTOR PHYSICS 9

Properties of semiconductors **–** Energy band diagram – Direct and indirect semiconductors – Intrinsic Semiconductors – Carrier concentration (Derivation) – Variation of Fermi level with temperature **–** Extrinsic semiconductors **–** Carrier concentration in N-type & P-type semiconductors (qualitative) – Variation of Fermi level with temperature and carrier concentration **–** Carrier transport: drift and diffusion transport – Einstein's relation – Hall effect and devices – Zener and avalanche breakdown in p-n junctions – Ohmic contacts – tunnel diode – Schottky diode – MOS capacitor.

UNIT - III DIELECTRIC MATERIALS 9

Basic definitions – polarization processes – Frequency and temperature dependence of polarization – Internal field – Classius-mosotti relation (derivation) – Dielectric constant experiment **–** Relation between dielectric constant and Refractive index – dielectric loss – dielectric breakdown – High K dielectric – applications of dielectric (capacitor, transformer) – Ferro electricity and its applications.

UNIT - IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes – absorption, emission and scattering of light in metals, insulators and semiconductors (concepts only) - photocurrent in a p-n diode – Photo voltaic effect **–** solar cell and its types – LCD **–** LED – Organic LED – Laser diodes – Exciton – quantum confined stark effect.

UNIT - V NANO ELECTRONIC DEVICES 9

Quantum structures, Quantum confinement – Density of states in quantum well, quantum wire and quantum dot structures(qualitative) **–** Band gap of nanomaterials – Quantum size effect **–** Size dependence of fermi energy – Quantum dot laser **–** Coulomb blockade effect – single electron transistor (SET) **–** Magnetic semiconductor **–** Carbon nanotubes**:** types, properties and applications.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Differentiate classical, quantum electron theories and energy band theory.
- Discuss the properties of semiconductors with applications of the p-n junction and diodes.
- Explain dielectric properties of materials.
- Classify optical materials for Opto – electronic applications.
- Clarify the basic operations of p-n junction devices like solar cells, LED, LCD etc
- Explain different quantum structures, size effect and carbon nanotubes.

TEXT BOOKS:

1. B.K.Pandey and S.Chaturvedi, “Engineering Physics”, Cengage learning, 2013.
2. V.Rajendran, “Engineering Physics”, Tata Mc Graw-Hill Education, 2011
3. Charles Kittel, “Introduction to solid state Physics”, John Wiley & sons, 8th edition, 2015.

REFERENCES:

1. G.W. Hanson, “Fundamentals of nano electronics”, Pearson Education, 2009
2. B. Rogers, Adams and S. Pennathur, “Nanotechnology: Understanding Small Systems”, CRC Press, 2019
3. N. Garcia and A. Damask, “Physics for Computer Science Students”, Springer Verlag, 2012.

20EC201	NETWORK ANALYSIS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To study the basic laws on Circuits and to calculate the voltage and current in circuit using basic theorems.
- To apply the concept of transients and resonance in series and parallel circuit
- To explore two port networks and analyze different types of two port network.

PRE-REQUISITE: NIL

UNIT-I BASIC NETWORK ANALYSIS AND NETWORK TOPOLOGY 12

Basic Circuit Analysis: Ohm‘s Law – Kirchhoff‘s laws – Mesh current and node voltage method of analysis for D.C and A.C. circuits , voltage and current division, source transformation – star delta conversion. **Network topology**: Network topology matrices associated with graphs; incidence, fundamental cut set and fundamental circuit matrices.

UNIT- II NETWORK THEOREMS FOR DC AND AC CIRCUITS 12

Network Theorems: Superposition theorem, Thevenin‘s theorem, Norton‘s theorem, Reciprocity theorem, Maximum power transfer theorem, Duality and dual networks.

UNIT - III RESONANCE AND COUPLED CIRCUITS 12

Resonance: Series resonance - Parallel resonance - Variation of impedance with frequency - Variation in current through and voltage across L and C with frequency – Bandwidth - Q factor - Selectivity. **Coupled Circuits**: Self inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multi-winding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupled circuits.

UNIT - IV TRANSIENT ANALYSIS FOR DC AND AC CIRCUITS 12

Transient Analysis: Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitation by Step Signal, Impulse Signal and exponential sources - Complete response of RC, RL and RLC Circuits to sinusoidal excitation.

UNIT - V TWO PORT NETWORKS PARAMETER 12

Two port networks: Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid(H) Parameters, Interconnection of two port networks, Symmetrical properties of T and π networks

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Apply Kirchoff's law for AC & DC circuits.
- Apply basic laws in Network topology.
- Apply network theorems to AC & DC circuits.
- Understand the concepts of resonance & coupled circuit.
- Analyze transient response for AC & DC circuits.
- Apply the properties of Two port networks in an electrical circuit.

TEXT BOOKS:

1. A Sudhakar, S Shyammohan and Palli, "Circuits and Network Analysis and synthesis Tata McGraw-Hill", 2015.
2. William H. Hayt, Jr. Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysisll, McGraw Hill Science Engineering", Eighth Edition, 11th Reprint 2016.

REFERENCES:

1. Joseph Edminister and Mahmood Nahvi, "Electric Circuits, Schaum's Outline Series, Tata McGraw Hill Publishing Company", New Delhi, Fifth Edition Reprint 2016.
2. L Robert Boylested, "Experiments in Circuit Analysis to Accompany Introductory Circuit Analysis", PHI, 2002.
3. M.Russell, Mersereau and Joel R. Jackson, "Circuit Analysis- A System Approach", Pearson Education, 2009.
4. Steven T. Karris, "Circuit Analysis I with MATLAB Applications", Orchard Publications, 2004.

20GE201	ENGINEERING GRAPHICS	L	T	P	C
		2	0	2	3

OBJECTIVES:

- To develop graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose national standards related to technical drawings.

PRE-REQUISITE: NIL

CONCEPTS AND CONVENTIONS (Not for Examination)

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

UNIT-I PROJECTION OF POINTS AND LINES 6+6

Orthographic projection – Principles - Principal planes - Projection of points in all quadrants - 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.

UNIT-II PROJECTION OF PLANE SURFACES 6+6

Projection of planes (Polygonal and Circular surfaces) inclined to both the principal planes by rotating object method.

UNIT - III PROJECTION OF SOLIDS 6+6

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+6

Sectioning of simple solids in 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 sectioned solids – Prisms, pyramids, cylinder and cone.

UNIT - V ISOMETRIC PROJECTION AND FREEHAND SKETCHING 6+6

Principles of Isometric Projection – Isometric scale – Isometric projections of simple solids - truncated Prisms and Pyramids.

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

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Familiarize with the fundamentals and standards of Engineering graphics.
- Draw the orthographic projections of points, lines and planes.
- Draw the projections of simple solids like prisms, pyramids, cylinder and cone.
- Draw the projections of sectional views of solids and develop its lateral surfaces.
- Draw the isometric projection of simple objects, truncated prism and pyramids.
- Draw the free hand sketching of simple objects.

TEXT BOOKS:

1. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 30th Edition, 2017.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 15th Edition, 2018.

REFERENCES:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education, 3rd Edition, 2012.

PUBLICATION OF BUREAU OF INDIAN STANDARDS:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001: Technical drawings - General principles of presentation.
4. IS 11669 – 1986:General principles of dimensioning on technical drawings.
5. SP 46 *(*2003*)*: Engineering Drawing Practice for Colleges.
6. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SPECIAL POINTS APPLICABLE TO EXAMINATIONS ON ENGINEERING GRAPHICS:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

20GE204	BASIC ELECTRICAL ENGINEERING AND ELECTRON DEVICES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the operation of Electrical Machines
- To learn the working principle and circuit model of Static Devices
- To study about the concepts of semiconductor devices such as PN diode, Bipolar and Field effect transistor and some special semiconductor devices.

PRE-REQUISITE: NIL

UNIT-I DC MACHINES 9

Introduction –Constructional features-Motoring and Generation principle-EMF and Torque equation-Circuit model-Methods of Excitation and Magnetization characteristics-starting and speed control.

UNIT- II AC MACHINES 9

Principle of operation of three-phase induction motors- Construction-Types –Equivalent circuit-single phase induction motors-Construction –types –starting and speed control methods-Alternator-working principle-equation of induced EMF-voltage regulation, synchronous motors-working principle-starting methods-Torque equation-stepper motors.

UNIT-III TRANSFORMER 9

Introduction-Ideal transformer-Accounting for finite Permeability and core loss-circuit model of transformer-Determination of parameter of circuit model of transformer-Voltage Regulation- efficiency-Three Phase transformers-Auto transformers.

UNIT- IV SEMICONDUCTOR DIODE AND SPECIAL DEVICES 9

PN junction diode, Current equations, Switching Characteristics, Breakdown in PN Junction Diodes-Varactor diode – Metal-Semiconductor Junction- MESFET-UJT, SCR, Diac, Triac.

UNIT-V TRANSISTORS 9

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

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Demonstrate the principle of operation, starting and speed control of D.C machines.
- Describe the construction , principle of operation and performance of A.C machines
- Explain the operation and circuit model of transformer.
- Describe the theory, construction and operation of semiconductor diode and special Electronic Devices.
- Explain the concepts and working of Bipolar Junction Transistors.
- Explain the concepts and working of Field effect Transistors such as JFET and MOSFET.

TEXT BOOKS:

1. D P Kothari and I.J Nagarath, “Basic Electrical and Electronics Engineering”, McGraw Hill Education(India) Private Limited, 4th Edition, 2019.
2. S Salivahanan, N Suresh Kumar, “Electronic Devices and Circuits”, McGraw Hill Education(India) Private Limited, 4th Edition, 2012.

REFERENCES:

1. S.K.Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson India,2011.
2. Mittle N., “Basic Electrical and Electronics Engineering”, Tata McGraw Hill,24th Reprint, 2016.
3. Donald A Neamen and Dhrubes Biswas “Semiconductor Physics and Devices”, McGraw Hill Education(India) Private Limited, 4th Edition, 2012.
4. Robert Boylestad and Louis Nashelsky., “Electron Device and Circuit Theory” Pearson Prentice Hall, 10th edition, 2008.

20GE2L2	UNIX AND SHELL SCRIPTING LABORATORY	L	T	P	C
		1	0	2	2

OBJECTIVES:

- To understand the key features of UNIX
- To familiar with various UNIX commands.
- To understand the concepts of Shell programming.
- To familiarize with 'vi' editor.
- To acquire basic 'C 'programming skills.

PRE-REQUISITE: NIL

LIST OF PROGRAMS

1. Study of UNIX OS, UNIX Architecture, Features of UNIX, Types of Shells.
2. General purpose utilities commands - cal, date, echo, printf, bc, tty, uname
3. Directory related commands – pwd, cd, mkdir, rmdir
4. Files related commands – cat, cp, rm, mv, more, file, wc, cmp, ls, chmod
5. Filtering commands – head, tail, sort, cut, paste, uniq, tr, grep
6. Shell programming – read and echo, conditional statements – if –then-fi, it-then-else-fi, test, nested if-elses, case structure.
7. Shell Programming – Loop Control Structure – while, until, for, break, continue
8. Simple C Programs in 'vi' editor.
9. C Programs using Conditional Statements – Finding Odd or Even, Biggest among three numbers, Finding the number is prime or not,
10. C Programs using Conditional Statements – Reverse the number, Arithmetic operationsusing switch - case.
11. C Programs using Looping Statements – Factorial of n numbers, Checking Armstrong Number or Not.
12. C Programs using Looping Statements – Fibonacci Series, Printing number of uppercase and lowercase letter.
13. C Programs using Command Line Arguments – Biggest Among three numbers
14. C Programs using Arrays – Finding the largest & smallest number in the given array, Sorting Arrays.
15. C Programs using Arrays – Addition and Subtraction of two matrices.

PLATFORM NEEDED: Unix Operating System / any flavor of Linux and C Compiler

TOTAL: 15 + 30 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Demonstrate the various General purpose utilities, Directory, Files and Filtering commands.
- Develop simple shell programs using conditional and looping constructs.
- Develop simple C programs in 'vi' editor using conditional and looping statements.
- Develop simple C programs in 'vi' editor using command line arguments.
- Develop C programs in 'vi' editor for sorting a given set of numbers.
- Develop C programs in 'vi' editor to perform matrix addition, subtraction.

20EC2L1	CIRCUITS AND DEVICES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To gain hands on experience in KVL & KCL & Various Theorems.
- To learn the characteristics of basic electronic devices such as Diode, BJT,FET, SCR.
- To understand the working of RL, RC and RLC circuits.

PRE-REQUISITE: NIL

LIST OF EXPERIMENTS:

1. Verification of KVL & KCL
2. Verification of Super Position Theorem
3. Verification of Thevenin & Norton theorem
4. Verification of maximum power transfer & reciprocity theorem
5. Determination of Resonance Frequency of Series & Parallel RLC Circuits
6. Transient analysis of RL and RC circuits
7. Characteristics of PN Junction Diode and Zener diode
8. Common Emitter input-output Characteristics
9. Common Base input-output Characteristics
10. FET and UJT Characteristics
11. SCR Characteristics
12. Clipper, Clamper and Full Wave Rectifier circuits

LABORATORY REQUIREMENTS

1. BC 107, BC 148,2N2646,BFW10 – 25 each
2. 1N4007, Inductors – sufficientquantités
3. Bread Boards – 15 Nos
4. CRO (30MHz) – 10 Nos.
5. Function Generators (3MHz) – 10 Nos.
6. Dual Regulated Power Supplies (0 – 30V) – 10 Nos.

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Experimentally verify various Theorems
- Determine the resonant frequency, quality factor & bandwidth of the RLC circuits
- Perform the transient analysis of RL and RC circuits
- Analyze the V-I characteristics of PN diode and its use in rectifier circuits.
- Analyze Input-Output characteristics of BJT.
- Analyze the V-I Characteristics of FET, UJT &SCR.

20BS302	LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- Tointroducethebasicconceptsofvectorspace,lineartransformationsanddiagonalization .
- Toapplytheconceptofinnerproductpaces inorthogonalization.
- Tounderstand theprocedureto solvepartialdifferentialequationsand tolearnapplicationofpartialdifferentialequation.

PRE-REQUISITE:
Course Code: 20BS101
Course Name: Fundamentals of Engineering Mathematics

UNIT - I VECTOR SPACES **12**

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

UNIT - II LINEAR TRANSFORMATIONANDDIAGONALIZATION 12

Linear transformation - Null spaces and ranges - Dimension theorem - Matrix representation of a linear transformations – Eigen values and eigenvectors - Diagonalizability.

UNIT - III INNER PRODUCTSPACES 12

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

UNIT - IV PARTIAL DIFFERENTIALEQUATIONS 12

Formation – Solutions of first order equations – Standard types and equations reducible to standard types – Singular solutions – Lagrange's linear equation – Integral surface passing through a given curve – Classification of partial differential equations - Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous partial differentialequations.

UNIT - V FOURIER SERIES SOLUTIONS OF PARTIALDIFFERENTIALEQUATIONS 12

Dirichlet's conditions – General Fourier series – Half range sine and cosine series - Method of separation of variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

TOTAL: 60 PERIODS

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Apply the fundamental concepts of advanced algebra and their role in machine learning and applied contexts.
- Apply the concept of Linear transformation, Eigen value and Eigen vectors, diagonalization of a matrix for solving problems.
- Construct the least square fit and orthonormal basis for an inner product space by using Gram-Schmidt process.
- Solve given standard first order and higher order partial differential equations with constant coefficients.
- SolvedifferentialequationsusingFourierseriesanalysis.
- Solveoneand twodimensional heat flowproblemsand onedimensionalwave equation problems.

TEXT BOOKS:

1. A.H.Friedberg, A.J.Insel and L.Spence, “Linear Algebra”, Prentice Hall of India, New Delhi, 2017.
2. T.Veerarajan,“Linear Algebra and Partial Differential Equations”, TataMcGrawHill,NewDelhi,2018.

REFERENCES:

1. B.S.Grewal, “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44th Edition, 2017.
2. G.James, “Advanced Modern Engineering Mathematics”, Pearson Education, 4th Edition 2016.
3. D.C.Lay, “Linear Algebra and it’s a Applications”, 5th Edition, Pearson Education, 2018.
4. S.Kumaresan, “Linear Algebra – A Geometric Approach”, Prentice Hall of India, New Delhi, Reprint, 2018.
5. M.Chandrasekar, “Linear Algebra and Partial Differential Equations”, Vishnu Prints Media, 2nd Edition, 2019.

20EC301	ANALOG CIRCUITS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various methods of biasing in BJT, FET.
- To analyze the frequency response of small signal amplifiers.
- To learn and explain feedback amplifiers and power amplifier circuits in different modes of operation.
- To introduce the various types of oscillators and multivibrators.
- To understand the concept of small signal single and double tuned amplifiers.

PRE-REQUISITE:

Course Code: 20EC201 & 20GE204

Course Name: Network Analysis & Basic Electrical Engineering and Electron Devices

UNIT - I BIASING OF DISCRETE BJT, JFET9

BJT – Need for biasing – AC, DC Load Line and Bias Point – DC analysis of Transistor circuits - Various biasing methods of BJT – Thermal stability - Stability factors - Bias compensation techniques using diode, thermistor and sensistor – Biasing of JFET - Load Line and Bias Point - Various biasing methods of JFET.

UNIT - II SMALL SIGNAL ANALYSIS AND FREQUENCY RESPONSE 9

Small signal analysis of CE, CB and CC BJT amplifiers using Hybrid π model - Small signal analysis of CS, CD and CG JFET amplifiers using Hybrid π model. BJT frequency response – short circuit current gain – Miller effect - frequency response of FET - High frequency analysis of CE and CS amplifier.

UNIT - III FEEDBACK AMPLIFIERS AND POWER AMPLIFIERS 9

Feedback concepts – gain with feedback – effect of feedback on gain stability, distortion, bandwidth, topologies and analysis of series-series, series-shunt, shunt-series and shunt-shunt feedback amplifiers, Power amplifiers - Class A - Class B - Class AB - Class C.

UNIT - IV OSCILLATORS AND MULTIVIBRATORS 10

Barkhausen criterion for oscillation – Phase shift, Wien bridge, Hartley, Colpitt's, Clapp's and Crystal oscillators. Multivibrators: Astable – Monostable – Bistable, Clippers and Clampers – Schmitt trigger.

UNIT - V TUNED AMPLIFIERS 8

small signal tuned amplifiers – Analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers – Neutralization: Hazeltine neutralization method.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Determine the stability, Q point and D.C, A.C load line for different biasing types used for transistor operation.
- Derive the voltage gain, current gain for different transistor configuration by using the hybrid π model.
- Calculate the frequency response of BJT and FET.
- Explain the operation of different types of feedback amplifier and power amplifier.
- Derive the frequency of oscillation and condition of oscillation of RC, LC oscillator and Multivibrators.
- Determine the resonant frequency and Q factor of single tuned and double tuned amplifiers.

TEXT BOOKS:

1. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008.
2. Jacob Millman, Christos Halkias, Chetan Parikh, "Millman's Integrated Electronics - Analog and Digital Circuit and Systems", McGraw Hill Education, 2nd Edition, 2017.

REFERENCES:

1. Sedraand Smith, "Micro Electronic Circuits", Oxford University Press, 8thEdition, 2019.
2. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", PHI Learning, 10th Edition, 2008.
3. Donald. A. Neamen, "Electronic Circuits Analysis and Design", McGraw Hill Education (India) Pvt. Ltd., 3rdEdition, 2010.
4. S.Salivahanan,N.Suresh Kumar and A.Vallavaraj, "Electronic Devices and Circuits",Mc Graw Hill, 4th Edition, 2018.
5. J.B.Gupta, "Electronic Devices and Circuits", S.K. Kataria& sons, 6thEdition, 2016.

20EC302	SIGNALS AND SYSTEMS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- Understand the mathematical representation of signals and systems.
- Explain the concept of Linear Time Invariant Systems and the Convolution property.
- Represent a given continuous time signal in frequency domain using Fourier Series, Fourier Transform and Laplace Transform.
- Represent a given Discrete Time Signal in frequency domain using discrete time Fourier Transform and Z-Transform.
- Understand Spectrum Analysis of Continuous Time signals and sampled version of the CT signal.

PRE-REQUISITE:

Course Code: 20BS201

Course Name: Laplace Transform and Advanced Calculus

UNIT - I CLASSIFICATION OF SIGNALS AND SYSTEMS 12

Standard signals - Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids - Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification of systems - CT systems and DT systems – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable, Generation of elementary signals using MATLAB

UNIT - II ANALYSIS OF CONTINUOUS TIME SIGNALS 12

Fourier series for periodic signals - Fourier Transform – properties - Laplace Transforms and properties

UNIT - III LINEAR TIME INVARIANT - CONTINUOUS TIME SYSTEMS 12

Impulse response - convolution integrals - Differential Equation - Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel

UNIT - IV ANALYSIS OF DISCRETE TIME SIGNALS 12

Baseband signal Sampling – Fourier Transform of discrete time signals (DTFT) – Properties of DTFT - Z Transform & Properties

UNIT - V LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS 12

Impulse response – Difference equations - Convolution sum - Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems - DT systems connected in series and parallel

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Classify the continuous time and discrete time signals/systems.
- Determine the spectral characteristics of continuous time signal using Fourier and Laplace transform.
- Compute the impulse response and output of the continuous time LTI systems using Fourier and Laplace transform.
- Discuss the concept of continuous time to discrete time signals.
- Determine the spectral characteristics of DT signal using discrete time Fourier and Z transform.
- Compute the impulse response and output of the discrete time LTI systems using Fourier and Z transform.

TEXT BOOKS:

1. Simon Haykin and Barry Van Veen, "Signalsand Systems", Wiley, 2nd Edition, 2007.
2. B.P.Lathi and R.A.Green, "Principles of Linear Systems and Signals", Oxford University Press, 3rd Edition, 2018.

REFERENCES:

1. Allan V. Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, 2015.
2. Hwei P. Hsu, "Schaum Outlines - Signals and Systems Matlab Examples", McGraw Hill, 4th Edition 2019.
3. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.
4. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.
5. S.Nagoorkani, "Signals and Systems - Simplified", McGraw Hill, 1st Edition, 2018.

20EC303 DIGITAL SYSTEM DESIGN

L	T	P	C
3	1	0	4

OBJECTIVES:

- To design digital circuits using simplified Boolean functions
- To analyze and design combinational circuits
- To analyze and design synchronous and asynchronous sequential circuits
- To understand Programmable Logic Devices
- To write HDL code for combinational and sequential circuits

PRE-REQUISITE: NIL

UNIT - I INTRODUCTION TO DIGITAL SYSTEM **12**

Digital Systems and Binary Numbers- Octal and Hexadecimal Numbers - Boolean Algebra and Logic Gates - Gate-Level Minimization - Introduction to Map Method - Four and Five Variable K-Map - Don't-Care Conditions - Tabulation Method. Introduction to Hardware Description Language: module description, gate delays, Boolean expressions, User Defined Primitives

UNIT - II COMBINATIONAL LOGIC **12**

Introduction of Combinational Circuits - Analysis Procedure: Deriving truth table and logic diagram for few examples - Design Procedure: Binary Adder/Subtractor - Half adders, Full adders, Parallel adder, Carry Look ahead adder, Binary subtractor - Code converters - Magnitude Comparators – Encoder - Priority encoder – Decoder - Decimal Adder - Binary Multiplier – Multiplexers - Demultiplexers - HDL Models of Combinational Circuits: Gate level modeling, Data flow modeling, Behavioralmodeling, Writing test bench for simple logics

UNIT - III SYNCHRONOUS SEQUENTIAL LOGIC **12**

Storage Elements: Latches - Flip-Flops - Analysis of Clocked Sequential Circuits – Analysis Examples with D, T and JK flip-flops - Moore and Mealy Finite State Machines - Synthesizable HDL Models of Sequential Circuits – HDL model for Flip-Flops, Latches, HDL Model of ZERO detector (Moore/Mealy model) - State Reduction and Assignment - Design Procedure - Shift Registers – SISO, SIPO, PIPO, PISO, Universal shift register – Counters - Ripple and Synchronous Counters, Ring counter, Jhonson counter - HDL for Registers and Counters

UNIT - IV ASYNCHRONOUS SEQUENTIAL LOGIC **12**

Introduction - Analysis Procedure - Analysis of SR based NOR and NAND - Analysis of circuit using SR Latch - Design Procedure - Reduction of state table and primitive flow table - Implication, merging of flow table, compatible pairs, maximal compatibles, closed covering conditions - Race-free state assignment - three row, four row and multiple row flow table examples – Hazards - Hazards in combinational and sequential logic circuits, Essential Hazards - Design of hazard-free logic circuits

UNIT - V MEMORY AND PROGRAMMABLE LOGIC **12**

Introduction - Random-Access Memory - Read/Write operation - Memory description in HDL - Memory Decoding - Address Multiplexing - Error Detection and Correction - Hamming Code - Read-Only Memory - Programmable Logic Array - Programmable Array Logic - Design of various combinational logic circuits using Programmable Logic Devices

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Summarize different types of number systems such as Binary, BCD, Octal and Hexadecimal and conversion between them.
- Apply Boolean laws and reduction techniques namely k-map and tabulation method to minimize the number of literals in a Boolean expression.
- Design combinational circuits like Adders, Subtractors, Encoders, Magnitude Comparators, Multipliers, Multiplexers by using logic gates and Design sequential circuits like Registers and counters by using Flip-flops.
- Analyze Asynchronous sequential circuits and design a hazard-free logic.
- Construct various Programmable Logic Devices with logic gates and Implement combinational logics in Programmable Logic Devices.
- Demonstrate Combinational and Sequential logic circuits by using Verilog Description Language and Demonstrate Finite State Machines by using Verilog Description Language.

TEXT BOOKS:

1. M.Morris R. Mano and Michael D. Ciletti, “Digital Design: With an Introduction to the Verilog HDL”, Pearson Education, 5th Edition, 2012.
2. D.P.Leach and A.P.Malvino, “Digital Principles and Applications”, Tata Mc Graw Hill, 2011.

REFERENCES:

1. M. Morris R. Mano, “Digital Design”, Pearson Education, 3rd edition, 2002.
2. G.K.Kharate, “Digital Electronics”, Oxford University Press, 2010.
3. John F. Wakerly, “Digital Design Principles and Practices”, Pearson Education, 5th Edition, 2017.
4. Charles H. Roth Jr and Larry L. Kinney, “Fundamentals of Logic Design”, CENGAGE Learning, 6th Edition, 2013.
5. Donald D. Givone, “Digital Principles and Design”, Tata Mc Graw Hill, 2003.
6. R.P.Jain, “Modern Digital Electronics”, Tata Mc-Graw Hill, 1995.

20HS301 UNIVERSAL HUMAN VALUES

L	T	P	C
2	1	0	3

OBJECTIVES:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

PRE-REQUISITE: NIL

UNIT - I INTRODUCTION TO VALUE EDUCATION 9

Value Education – Definition - Concept and Need for Value Education - The Evolution of Value Education: Natural acceptance, Self exploration - Fundamentals of value education - Happiness and Prosperity as parts of Value Education- fulfilling human aspirations.

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

UNIT - II HARMONY IN THE HUMAN BEING 9

Human being vs Value education – I' and Body synchronization - Understanding Myself as Co-existence of the Self and the Body - Realization - Self, Body needs - Scanning of Karma - Self and Body - Understanding Sanyam and Health.

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

UNIT - III HARMONY IN THE FAMILY, SOCIETY AND NATURE 9

Family as a basic unit of Human Interaction - Values in Relationships - The Basics for Trust and Respect in today's Crisis: Affection, e-Guidance, Reverence, Glory, Gratitude and Love – Harmony in society : Resolution, Prosperity, Fearlessness and Co-existence as Comprehensive Human Goal - Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.

Practice sessions: To discuss on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education. Gratitude as a universal value in relationship. Discuss with scenarios. Elicit examples from students' lives

UNIT - IV SOCIAL ETHICS 9

The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Order - Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.

Practice sessions: To discuss human being as cause of imbalance in nature, pollution, depletion of resources and role of technology

UNIT - V PROFESSIONAL ETHICS 9

Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies, Production System and Management Models.

Practice sessions: To discuss the conduct as an engineer or scientist

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Explain the significance of value inputs in a classroom and start applying them in their life and profession.
- Distinguish between Values and Skills to ensure happiness and prosperity.
- Distinguish between Thyself and the Body to ensure competency of an individual.
- Explain the role of a human being in ensuring harmony in society and nature.
- Distinguish between ethical and unethical practices, and apply suitable strategy to actualize a harmonious working environment.
- Develop an awareness of human values to appreciate the rights of others.

TEXT BOOKS:

1. R.R.Gaur, R. Sangal and G.P. Bagaria, “A Foundation Course in Human Values and Professional Ethics”, Excel Books, 2nd Revised Edition, New Delhi, Re-print 2019.
2. A.N. Tripathy, “Human Values”, New Age International Publishers, New Delhi, 2003.

REFERENCES:

1. E.G.Seebauer and Robert L. Berry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, 2000.
2. M.Govindrajran, S.Natrajan and V.S.Senthil Kumar, “Engineering Ethics (including Human Values)”, Eastern Economy Edition, Prentice Hall of India Ltd., 2004.
3. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 1996.
4. Charles E. Harries, Michael S. Protchard and Michael J. Rabins, “Engineering Ethics - Concepts and Cases”, Thomson Learning, 2000.
5. S.K.Chakraborty and Dabangshu Chakraborty, “Human Values and Ethics: Achieving Holistic Excellence”, ICFAI University Press, 2006.

20CS303	OBJECT ORIENTED PROGRAMMING AND DATA STRUCTURES	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To introduce the fundamentals of object oriented programming using C++.
- To implement object oriented programming concepts.
- To introduce linear data structures and their applications.
- To introduce non-linear data structures and their applications.
- To implement sorting and searching algorithms.

PRE-REQUISITE:

Corse Code**:** 20GE2L2
Course Name: Unix and Shell Scripting Laboratory

UNIT - I BASIC CONCEPTS OF OBJECT ORIENTED PROGRAMMING **9**

Overview of C++ – Structures – Tokens – Expressions - Control Structures - Classes and Objects - Class Scope and Accessing Class Members – Reference Variables – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Overloading: Function overloading and Operator overloading.

LAB COMPONENT

1. Develop a C++ program using classes and constructors.
2. Develop a C++ program for implementing function and operator overloading. **6**

UNIT - II

INHERITANCE AND POLYMORPHISM **9**

Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – This Pointer – Dynamic Binding - Virtual functions and polymorphism - File handling - Exception Handling - manipulating Strings.

LAB COMPONENT

1. Develop C++ program for implementing the different types of inheritance. **6**
2. Develop C++ program for implementing polymorphism.

UNIT - III LINEAR DATA STRUCTURES **9**

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists – Polynomial Manipulation – Stack ADT – Evaluating arithmetic expressions – Queue ADT - priority Queue.

LAB COMPONENT

1. Perform polynomial manipulation using list.
2. Develop C++ program to implement stack and queue data structures and their operations. **6**

UNIT - IV NON-LINEAR DATA STRUCTURES **9**

Trees – Binary Trees – Binary tree representation and traversals – Binary Search Trees - AVL Trees – Graph and its representations – Graph Traversals – Representation of Graphs – Topological sort - Breadth-first search – Depth-first search – Minimum Spanning Tree.

LAB COMPONENT

1. Develop C++ program for implementation of AVL Trees.
2. Develop C++ program for implementation of Graph Traversals Using Breadth-First Search and Depth-First Search **6**

UNIT - V SORTING AND SEARCHING 9

Sorting algorithms: Insertion sort – Shell sort - Heap sort - Quick sort – Merge sort – Searching: Linear search – Binary Search - Introduction to Algorithm design techniques – Backtracking - Dynamic programming - Greedy Algorithm - Divide and Conquer.

LAB COMPONENT

1. Develop C++ program for linear search and binary search.
2. Develop C++ program for quick sort and merge sort. **6**

TOTAL: 75 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Illustrate the features of C++
- Implement the concepts of Inheritance and Polymorphism
- Apply the linear data structures like Stack and Queue to various computing problems
- Implement the Non-linear data structures like trees, graphs and their applications
- Implement the sorting and searching algorithms
- Illustrate the algorithm design techniques

TEXT BOOKS:

1. Deitel and Deitel, “C++, How To Program”, Pearson Education, 10th Edition, 2017.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Addison Wesley, 4th Edition, 2014.

REFERENCES:

1. Bhushan Trivedi, “Programming with ANSI C++, A Step-By-Step approach”, Oxford University Press, 2010.
2. Goodrich, T.Michael, Roberto Tamassia and David Mount, “Data Structures and Algorithms in C++”, Wiley, 7th Edition, 2004.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Mc Graw Hill, 2nd Edition, 2002.
4. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, 3rd Edition, 2007.
5. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, “Fundamentals of Data Structures in C++”, Galgotia Publications, 2007.

20EC3L1 ANALOG CIRCUITS LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- To design a regulated power supply.
- To study the frequency response of CE and CS amplifier.
- To study the operation of feedback amplifiers and oscillators.
- To learn the operation of wave shaping circuits and Multivibrators.
- To simulate various circuits using SPICE.

LIST OF EXPERIMENTS

DESIGN AND ANALYSIS OF THE FOLLOWING CIRCUITS:

1. Design of regulated power supply
2. Frequency response of CE and CS amplifiers
3. RC Coupled Cascaded CE amplifier
4. Series and Shunt feedback amplifiers - Frequency response
5. Single Tuned Amplifier
6. RC Phase Shift Oscillator
7. Hartley Oscillator and Colpitts Oscillator
8. Astable and Monostable Multivibrators
9. Clippers and Clampers

SIMULATION USING SPICE (USING TRANSISTOR):

10. Analysis of BJT, FET with Fixed bias and Voltage divider bias
11. Twin-T Oscillator
12. Double Tuned Amplifiers
13. Bistable Multivibrator
14. Schmitt Trigger circuit

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO

- Design and test rectifiers, filters, regulated power supplies and frequency response of BJT/FET.
- Design and measure the frequency response of series and shunt feedback amplifiers and a single tuned amplifier.
- Design of various types of oscillators.
- Design of wave shaping circuits and Multivibrators.
- Analyze the frequency response of BJT, FET and Tuned amplifiers by using SPICE.
- Analyze the frequency of oscillation for Oscillators and Multivibrators by using SPICE.

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS

1. CRO/DSO – 15 Nos.
2. Signal Generator / Function Generators – 15 Nos.
3. Dual Regulated Power Supplies – 15 Nos.
4. Desktop PCs with SPICE software – 15 Nos.
5. Transistor/FET (BJT – NPN – PNP, NMOS/PMOS) – 50 Nos.
6. PN Junction Diodes – 50 Nos.
7. Digital Multimeter – 15 Nos.
8. Digital LCR Meter – 2 Nos.
9. Decade Resistance Box – 10 Nos.
10. Decade Inductance Box – 10 Nos.
11. Decade Capacitance Box – 10 Nos.
12. IC-7805 – 15 Nos.
13. SPICE Circuit Simulation Software: (any public domain or commercial software)

Components and Accessories:

Transistors, Resistors, Capacitors, Inductors, Diodes, Zener Diodes, Bread Boards, Transformers.

20EC3L2 DIGITAL SYSTEM DESIGN LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- To understand the various components used in the design of digital computers.
- To construct and verify the truth table of digital circuits in accordance with Boolean Laws.
- To design and construct different combinational and sequential circuits and verify its functionality.
- To write HDL code for combinational and sequential circuits and able to familiar with virtual experimentation.

LIST OF EXPERIMENTS

1) Verification of Boolean Theorems using basic gates.
2) Design and implementation of Half Adder and Full Adder using basic gates.
3) Design and implementation of Code Converters using basic gates.
4) Design and implementation of 4 – bit binary adder / subtractor using MSI.
5) Design and implementation of 4 – bit BCD adder using MSI.
6) Design and implementation of parity generator / checker using basic gates and MSI.
7) Design and implementation of magnitude comparator using basic gates and MSI.
8) Design and implementation of combinational circuits / Boolean expressions by using Multiplexers MSI.
9) Design and implementation of 4 bit SISO, SIPO, PIPO, PISO Shift registers using Flip-Flops.
10) Design and implementation of synchronous counters using Flip-Flops.
11) Design and implementation of asynchronous counters using Flip-Flops.
12) Simulation of Half Adder and Full Adder, Multiplexers, Counters using Verilog HDL

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Construct digital circuits with minimum number of gates by applying Boolean laws.
- Construct combinational circuits like adders, code-converters, parity error checker and magnitude comparators by using logic gates / MSI with respect to the design specifications.
- Realize the application of multiplexers by implementing various combinational logic / Boolean expressions with the help of multiplexers.
- Construct and verify the function table of 4-bit SISO, SIPO, PIPO, PISO shift registers using D Flip-Flops.
- Construct synchronous and asynchronous counters by using Flip-Flops as per the design specifications.
- Model the adders, multiplexers, registers and counters with Verilog HDL.

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS

HARDWARE: 1. Digital trainer kits 30 Nos.
2. Digital ICs required for the experiments in sufficient numbers

SOFTWARE: 1. HDL simulator.

20EC401	RANDOM PROCESS AND INFORMATION THEORY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide necessary basic concepts in probability and random variables for applications in communication engineering.
- To understand the basic concepts of random processes.
- To understand the concept of correlation and spectral densities.
- To understand the significance of linear systems with random inputs.
- To know the effect of noise on communication systems.

PRE-REQUISITE:

Course code:20EC302
Course Name: Signals and Systems

UNIT - I PROBABILITY AND RANDOM VARIABLES 9

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

UNIT - II TWO DIMENSIONAL RANDOM VARIABLE AND RANDOM PROCESSES 9

Joint distributions – Marginal and conditional distributions – Covariance, Correlation - Random Process: Basic concepts - Stationary Processes - Mean, Correlation and Covariance functions - Properties - Ergodic Processes.

UNIT - III LINEAR SYSTEMS WITH RANDOM INPUTS 9

Transmission of Random Process over LTI Systems - Random Processes in the Frequency Domain, Power spectral density – Properties - Cross spectral density – Gaussian Processes – Properties - Central limit theorem.

UNIT - IV NOISE 9

Noise sources and types - White Noise - Narrow band Noise - Representation of Narrow band noise – in-phase and quadrature Phase components - Envelope and phase Components - Sine wave plus narrow band noise.

UNIT - V INFORMATION THEORY 9

Discrete Memory less Source - Information, Entropy - Source coding theorem - Data Compaction - Huffman code - Shannon fano code - Discrete memory less channel - Mutual Information - Channel capacity - Channel coding Theorem - Information capacity theorem.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Apply the concepts of probability and standard distributions with real life phenomenon.
- Apply the concept of random processes to the design of communication systems.
- Apply the concept of correlation and spectral densities to derive the response of LTI system for random Inputs.
- Explain the effect of noise on communication systems.
- Calculate information, Entropy, Mutual Information and channel capacity for the given channel.
- Compute the coding using source coding schemes.

TEXT BOOKS:

1. O.C.Ibe, “Fundamentals of Applied Probability and Random Processes”, Elsevier, 1st Indian Reprint, 2007.
2. Simon Haykin, “Communication Systems”, Wiley, 4th Edition, 2014.

REFERENCES:

1. J.G.Proakis and M.Salehi, “Fundamentals of Communication Systems”, Pearson Education 2014.
2. P.Z.Peebles, “Probability, Random Variables and Random Signal Principles”, Tata McGraw Hill, 4th Edition, New Delhi, 2002.
3. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw Hill Edition, New Delhi, 2004.
4. S.L.Miller and D.G.Childers, “Probability and Random Processes with Applications to Signal Processing and Communications”, Academic Press, 2004.
5. B.P.Lathi, “Modern Digital and Analog Communication Systems” Oxford University Press, 4th Edition, 2017.
6. H.P.Hsu, “Schaum Outline Series - Analog and Digital Communications”, TMH 2006.

20EC402 COMPUTER ARCHITECTURE AND ORGANIZATION

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the organization of the various functional units and components of computers.
- To identify the elements of modern instruction sets and their impact on processor design.
- To create control units for the system with soft and hard programming.
- To explain the function of each element of a memory hierarchy.
- To understand the concepts of parallel processors and multiprocessors.

PRE-REQUISITE:

Course code: 20EC303
Course Name: Digital System Design

UNIT - I COMPUTING ELEMENTS & ARITHMETIC SYSTEM 9

Elements of Computers and its Limitations - Processor Level Components & Design - CPU Organization - Operations and Operands of the Computer Hardware - Arithmetic for computers - Parallelism and Subword Parallelism - Fallacies and Pitfalls.

UNIT - II PROCESSOR DESIGN 9

Logic Design Conventions – Data path Implementation Scheme - Combinational and Sequential ALUs - Robertson algorithm - Booth's algorithm - Modified Booth's Algorithm - Pipelined Datapath and Control - Data Hazards - Control Hazards – Exceptions - Parallelism via Instructions.

UNIT - III CONTROL DESIGN 9

Hardwired Control - Classical Method - One-hot method - Encoding Methods - Microprogrammed Control - Multiplier Control Unit - CPU Control Unit - Pipeline Control - Instruction Pipelines - Pipeline Performance - Superscalar Processing and Nano Programming.

UNIT - IV MEMORY HIERARCHY 9

Memory Technologies - Basics of Caches - Measuring and Improving Cache Performance - Dependable Memory Hierarchy - Virtual Machines - Virtual Memory - Framework for Memory Hierarchy - Cache Coherence - Cache Controllers.

UNIT - V PARALLEL PROCESSORS 9

Introduction - SISD, MIMD, SIMD, SPMD, and Vector processors - Hardware Multithreading - Multicore and Other Shared Memory Multiprocessors - Introduction to Graphics Processing Units - Clusters - Warehouse Scale Computers, and Other Message-Passing Multiprocessors - Introduction to Multiprocessor Network Topologies.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Describe the fundamental organization of a computer system.
- Illustrate the functional units of a processor and its constraints.
- Develop architectures required for control path design.
- Categorize the various parts of a system memory hierarchy.
- Describe the basic concepts of parallel computing, pipelining and vector processing system.
- Demonstrate the computer architecture concepts related to the design of modern processors, memories and commercially available computers.

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The hardware / software interface”, 5th Edition, Morgan Kaufmann, Waltham, 2014.
2. John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, Tata McGraw–Hill, 2012.

REFERENCES:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky and NaraigManjikian, “Computer Organization and Embedded Systems”, 6th Edition, Mc-Graw Hill, New York, 2012.
2. Morris Mano, “Computer System Architecture”, 3rd Edition, Pearson Education, 2008.
3. P.PalChaudhuri, “Computer Organization and Design”, 3rd Edition, Prentice Hall of India, 2009.
4. John L. Hennessy and David A. Patterson, “Computer Architecture - A Quantitative Approach”, Morgan Kaufmann, Waltham, 2012.
5. John Paul Shen and Mikko H. Lipasti, “Modern Processor Design – Fundamentals of Superscalar Processors”, Waveland Press, Inc., Long Grove, 2013.

20EC403	ELECTROMAGNETIC FIELDS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To introduce students with different coordinate systems.
- To familiarize the students with the different concepts of electrostatic, magneto static and time varying electromagneticsystems.
- To expose the students to the ideas of electromagnetic waves.

PRE-REQUISITE:
Course Code: 20BS101, 20BS201 &20BS203
Course Name: Fundamentals of Engineering Mathematics, Laplace Transform and Advanced Calculus & Physics for Electronics Engineering

UNIT - I INTRODUCTION 12

Review of vector algebra: Scalars and Vectors -Unit Vector -Vector Addition and Subtraction -Position and Distance Vectors -Vector Multiplication - Components of a Vector
Coordinate systems and transformation: Introduction - Cartesian Coordinates - Circular Cylindrical Coordinates - Spherical Coordinates - Constant-Coordinate Surfaces
Vector calculus: Introduction -Differential Length, Area, and Volume -Line, Surface, and Volume Integrals - Del -Gradient of a Scalar -Divergence of a Vector and Divergence Theorem -Curl Operator of a Vector and Stokes's Theorem -Laplacian of a Scalar - Classification of Vector Fields

UNIT - II ELECTROSTATICS 12

Electrostatic fields: Introduction - Coulomb's Law and Field Intensity - Electric Fields due to Continuous Charge Distributions - Electric Flux Density - Gauss's Law - Maxwell's Equation - Applications of Gauss's Law - Electric Potential - Relationship between E and V - Maxwell's Equation -An Electric Dipole and Flux Lines - Energy Density in Electrostatic Fields - Application Note -Electrostatic Discharge - Electric Field Plotting using MATLAB
Electric fields in material space: Introduction - Properties of Materials - Convection and Conduction Currents – Conductors - Polarization in Dielectrics - Dielectric Constant and Strength - Linear, Isotropic, and Homogeneous Dielectrics - Continuity Equation and Relaxation Time - Boundary Conditions - Application Note - Materials with High Dielectric Constant
Electrostatic Boundary Conditions: Introduction - Poisson's and Laplace's Equations - Uniqueness Theorem - General Procedures for Solving Poisson's or Laplace's Equation - Resistance and Capacitance

UNIT - III MAGNETOSTATICS 12

Magnetostatic Fields: Introduction -Biot–Savart's Law -ampere's circuit law - Maxwell's equation -applications of ampere's law -magnetic flux density - Maxwell's equation - Maxwell's equations for static fields - magnetic scalar and vector potentials -derivation of Biot–savart's law and Ampere's law
Magnetic Forces, Materials, and Devices: Introduction -forces due to magnetic fields - magnetic torque and moment -a magnetic dipole -magnetization in materials -classification of materials -magnetic boundary conditions -inductors and inductances -magnetic energy - magnetic circuits -force on magnetic materials

UNIT - IV MAXWELL's EQUATIONS 12

Introduction - Faraday's Law - Transformer and Motional Electromotive Forces - Displacement Current - Maxwell's Equations in Final Forms - Time-Varying Potentials - Time-Harmonic Fields

UNIT - V ELECTROMAGNETIC WAVE PROPAGATION 12

Introduction - Waves in General - Wave Propagation in Lossy Dielectrics - Plane Waves in Lossless Dielectrics - Plane Waves in Free Space - Plane Waves in Good Conductors - Wave Polarization - Power and the Poynting Vector - Reflection of a Plane Wave at Normal Incidence - Reflection of a Plane Wave at Oblique Incidence

TOTAL: 60 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Define and recognize different co-ordinate systems to describe the spatial variations of the physical quantities dealt in electromagnetic field theory as they are functions of space and time. Apply different techniques of vector calculus to understand different concepts of electromagnetic fieldtheory.
- Explain fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields (Field intensity, Flux density etc.) in different media using the fundamentallaws.
- Determine the electromagnetic force exerted on charged particles, current elements, working principle of various electric and electromagnetic energy conversion devices.
- Design electromagnetic energy storage devices like capacitor, inductor which are frequently used in electrical systems.
- Deduce the concepts and equations of electromagnetic waves, means of transporting energy or information, in the form of radio waves.
- Explain the concepts and equations of electromagnetic wave propagation in different media.

TEXT BOOKS:

1. Mathew N.O. Sadiku, “Elements of Electromagnetic”, Oxford UniversityPress, 4th Edition, 2015.
2. W.H. Hayt and J.A. Buck, “Engineering Electromagnetics”, McGraw-Hill (India), 8th Edition, 2011.

REFERENCES:

1. W.H. Hayt and J.A. Buck, “Engineering electromagnetics”, McGraw-Hill (India), 8th edition, 2011.
2. D.K. Cheng, “Field and wave electromagnetics”, Pearson (India), 2nd edition, 1989.
3. Griffiths, “Introduction to electrodynamics”, Pearson (India), 4th edition, 2013.
4. K. A. Gangadhar, P.M. Ramanathan, “Electromagnetic Field Theory”, Khanna Publishers, 8th edition, 2015.
5. Nannapaneni Narayana Rao, “Elements of Engineering Electromagnetics”, Pearson education, 6th edition, 2004.

20EC404	ANALOG ELECTRONICS AND INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of voltage regulators and 555 timers
- To introduce the basic building blocks of linear integrated circuits
- To learn the linear and non-linear applications of operational amplifiers
- To introduce the theory and applications of PLL and data converters

PRE-REQUISITE:
Course Code: 20EC301
Course Name: Analog Circuits

UNIT - I VOLTAGE REGULATORS AND 555 TIMER 9

Voltage regulators: Linear mode power supply - Rectifiers - Half-Wave Rectifier - Full-Wave Rectifiers - Filters - Voltage regulation - Linear series and shunt Voltage Regulators. Series op-amp regulator - IC voltage regulator: Fixed and adjustable voltage regulators – IC723 general purpose regulator.
555 timer: Monostable multivibrators – Astable multivibrators – Application.

UNIT - II BASICS OF OPERATIONAL AMPLIFIER 9

Introduction and classification of IC – Basic information about Op-amp – Internal circuit diagram of IC 741 - general operational amplifier stages - Differential amplifier - Low frequency small signal analysis - Constant current mirror and Current sources - ideal op-amp characteristics – open and closed loop configurations – DC and AC characteristics.

UNIT - III APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Sign changer, Scale changer, Phase shift circuits, voltage follower, V-to-I and I-to-V converters, adder, subtractor, Differential amplifier, Instrumentation amplifier, Integrator, Differentiator, Multiplier, Logarithmic amplifier, Antilogarithmic amplifier, Voltage to Frequency and Frequency to Voltage converter, Precision rectifier, peak detector, clipper and clamper, Active filters: Low pass, High pass and Band pass.

UNIT - IV COMPARATORS AND WAVEFORM GENERATORS 9

Comparator: Open loop Op-amp configuration – Inverting and Non-inverting comparator – Applications of comparator - Regenerative comparator (Schmitt trigger)
Waveform generators: Principles of sine wave generators – RC phase shift and Wein bridge oscillator, Multivibrators – Astable and Monostable multivibrator, triangular waveform and sawtooth waveform generator

UNIT - V PLL AND DATA CONVERTERS 9

PLL: Block diagram – Operation of basic PLL, closed loop analysis - voltage controlled oscillator –Monolithic PLL IC 565 – Applications of PLL.
Data converters: D/A converters – specifications – weighted resistor type, R-2R ladder - Inverted R-2R ladder – High speed sample and hold circuits. A/D converters – Specifications – Flash type – successive approximation type – counter ramp – Dual slope type.

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Explain the characteristics of an operational amplifier.
- Design the operational amplifier circuits for various linear and non-linear applications.
- Design waveform generator circuits using Op-amp comparator.
- Explain the basics of PLL and its applications.
- Design the ADC and DAC using op-amps.
- Explain the functional operations and applications of 555 timer circuits and IC voltage regulators.

TEXT BOOKS:

1. D.Roy Choudhry and Shail Jain, “Linear Integrated Circuits”, New Age International pvt. Ltd., 5th Edition, 2018.
2. J.B.Gupta, “Electronic Devices and Circuits”, S.K. Kataria& sons, 6th Edition, 2016.

REFERENCES:

1. Sergio France, “Design with operational amplifiers and analog integrated circuits”, Tata McGraw-Hill, 4th Edition, 2016.
2. S.Salivahanan and V.S.KanchanaBhaskaran, “Linear Integrated Circuits”, Tata McGraw Hill, 2nd Edition (4th reprint), 2016.
3. Ramakant A. Gayakwad, “Op-amp and Linear ICs”, Prentice Hall / Pearson Education, 4th Edition, 2015.
4. Robert F. Coughlin and Frederick F. Driscoll, “Operational amplifiers and linear integrated circuits”, PHI, 6th Edition, 2001.
5. B.S.Sonde, “System design using Integrated circuits”, New Age publications, 2nd Edition, 2001.
6. Gray and Meyer, “Analysis and Design of Analog Integrated circuits”, Wiley International, 5th Edition, 2009.
7. William D. Stanley, “Operational amplifiers with Linear Integrated circuits”, Pearson Education, 4th Edition, 2001.

20HS401 ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
2	0	0	2

OBJECTIVES:

- To study the scope and significance of environment.
- To understand the interrelationship between living organism and environment.
- To get a conceptual knowledge on various types of pollution and its effects.
- To gain knowledge on various natural resources and its significances.
- To provide knowledge on solid wastes, disposal methods and natural disasters and its management.
- To learn social issues such as human welfare, sustainability related to population.

PRE-REQUISITE:NIL

UNIT - I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY **6**

Environment – definition, importance, public awareness

Ecosystem – concept, structure and function – producers, consumers and decomposers - characteristic features, structure and function of the forest ecosystem and grassland ecosystem **Biodiversity** – definition, types - genetic, species and ecosystem diversity – values - consumptive use, productive use, social, ethical, aesthetic and option values – hotspots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, endangered and endemic species of India. Assignment on conservation of biodiversity.

UNIT - II ENVIRONMENTAL POLLUTION **6**

Definition, causes, effects and control measures of (i) Air pollution (ii) Water pollution (iii) Soil pollution (iv) Marine pollution – role of an individual in prevention of pollution – pollution case studies - Climate change - global warming, acid rain, ozone layer depletion.

UNIT - III NATURAL RESOURCES **6**

Forest resources: Uses, over-exploitation, deforestation, case studies

Water resources: Surface water and ground water - uses, over-utilization, conflicts over water, Conservation of water – rain-water harvesting, dams-benefits and problems

Mineral resources: uses, over exploitation, environmental effects of extracting mineral resources, case studies.

UNIT - IV SOLID WASTE AND DISASTER MANAGEMENT **6**

Solid Waste Management: Introduction, types, effects on human beings and disposal management.

Disaster Management: Introduction, causes, effects and management of flood, cyclone, earthquake, landslide disasters – Case studies - roles and responsibilities of Government and Community

UNIT - V HUMAN POPULATION AND SOCIAL ISSUES **6**

Population growth, population explosion – family welfare programme – women and child welfare – human rights – value education – sustainable development – resettlement and rehabilitation – waste land reclamation – role of information technology in environment and human health. Debate on women and child welfare.

TOTAL: 30 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Describe the environment, ecosystem and their significances.
- Identify the threats to biodiversity.
- Identify the sources and implement technological solution to environmental pollution.
- Develop the knowledge on various natural resources and its effect on environment due to over utilization.
- Describe the disposal techniques of solid wastes and Record the consequences of natural disasters.
- Outline the social issues such as welfare, sustainability etc., and to relate with population growth.

TEXT BOOKS:

1. Anubha Kaushik and C.P.Kaushik, “Environmental Science and Engineering”, New Age International (P) Ltd, 6th Edition, 2018.
2. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2006.

REFERENCES:

1. ErachBharucha, “Text book of Environmental Studies”, Universities Press (I) Pvt. Ltd., Hyderabad, 2015.
2. G.Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India Pvt. Ltd., Delhi, 2014.
3. Gilbert M. Masters, “Introduction to Environmental Engineering and Science”, Pearson Education, 2nd Edition, 2004.

20EC405	PRINCIPLES OF DIGITAL SIGNAL PROCESSING	L	T	P	C
		2	1	2	4

OBJECTIVES:

- To learn Discrete Fourier Transform, its properties and its application to linear filtering
- To understand the characteristics of digital filters, design of FIR and IIR filters and its realization
- To understand the effects of finite precision representation on digital filters
- To learn the fundamental concepts of Multirate signal processing

PRE-REQUISITE:

Course Code: 20EC302
Course Name: Signals and Systems

UNIT - I DISCRETE FOURIER TRANSFORM **9**

Review of DTFT –Frequency – Domain sampling: The Discrete Fourier Transform – Properties of DFT – Linear filtering methods based on the DFT – Efficient computation of the DFT: FFT algorithms: Radix 2 FFT algorithms.

LAB COMPONENT

1. Sampling and Aliasing
2. Spectrum Analysis of DFT and FFT of a discrete time sequence (Using SCILAB or Python) **6**

UNIT - II FINITE IMPULSE RESPONSE FILTERS **9**

Characteristics of practical frequency selective filters - Design of FIR filters: symmetric and Anti-symmetric FIR filters - Design of linear phase FIR filters using windows (Rectangular, Hamming and Hanning window), Frequency sampling method. Structures for FIR systems - linear phase structure, direct form realizations.

LAB COMPONENT

Design of FIR filters – LPF, HPF, BPF, BSF using windowing method and analyzing its frequency spectrum (Using SCILAB or Python) **6**

UNIT - III INFINITE IMPULSE RESPONSE FILTERS **9**

Characteristics of commonly used analog filters - Butterworth filters, Chebyshev filters. Design of IIR filters from analog filters: Impulse invariance method, Bilinear transformation. Structure of IIR systems – Direct form structures, Cascade and parallel structures.

LAB COMPONENT

Design of IIR filters using Butterworth and Chebyshev filters and analyzing its frequency spectrum (Using SCILAB or Python) **6**

UNIT - IV FINITE WORD LENGTH EFFECTS **9**

Representation of Numbers – Quantization of filter coefficients – Round-off effects in Digital filters: Limit cycle oscillations in recursive systems – scaling to prevent overflow.

LAB COMPONENT

1. Fixed and Floating point representation of a discrete time sequence
2. Analyzing Quantization effect of a given signal

(Using SCILAB or Python)

6

UNIT - V MULTIRATE DIGITAL SIGNAL PROCESSING 9

Introduction – Decimation by a factor D – Interpolation by a factor I – Sampling rate conversion by a rational factor I/D – Implementation of sampling rate conversion – Multistage implementation of sampling rate conversion.

LAB COMPONENT

1. Program for implementing a decimation and interpolation
2. Linear phase FIR interpolation and decimation filter to interpolate a signal by a factor of L **6**

TOTAL: 75 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Compute DFT and IDFT coefficients of a discrete time sequences using FFT algorithms and output of the discrete time system.
- Analyze the spectral components in the audio signal.
- Construct and realize FIR digital filters.
- Construct and realize IIR digital filters.
- Analyze the spectrum of the various types of digital filter outputs.
- Identify the effect of quantization error in the implementation of digital filter.
- Calculate the fixed point and floating point quantization error using MATLAB / SCILAB / PYTHON / OCTAVE.
- Design the sampling rate converter for the given specifications.

TEXT BOOKS:

1. John G. Proakis& Dimitris G. Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, 5th Edition, Pearson Education, 2013. (ISBN-13: 9780137348657)
2. Sanjay K. Mitra, “Digital Signal Processing: A Computer based approach”, 4th Edition Tata Mc Graw Hill, 2017.

REFERENCES:

1. Emmanuel C. Ifeachor and Barrie W. Jervis, “Digital Signal Processing”, Pearson Education / Prentice Hall, 4th Edition, 2007.
2. A.V.Oppenheim, R.W.Schafer and J.R.Buck, “Discrete-Time Signal Processing”, Pearson, 8th Indian Reprint, 2004.
3. Vinay K. Ingle and John G. Proakis,”Digital Signal Processing using MATLAB”, 3rd Edition, Cengage Learning Custom Publication, 2011.
4. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw-Hill, 2006.
5. Ramesh Babu, “Digital Signal Processing”, Scitech Publication, 6th Edition, 2014.

20EC4L1 ANALOG INTEGRATED CIRCUITS LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- To apply operational amplifiers in linear and nonlinear applications.
- To acquire the basic knowledge of special function IC.
- To use SPICE software for circuit design.

PRE-REQUISITE: NIL

LIST OF ANALOG EXPERIMENTS

1. Inverting Amplifier, Non-Inverting Amplifier and Differential amplifier.
2. Integrator and Differentiator.
3. Active – Low pass filter, High Pass filter.
4. Active Band pass filter.
5. Phase shift oscillator and Wein bridge oscillator using Op-amp.
6. Astable multivibrator and Monostable multivibrator using op-amp IC 741.
7. Schmitt trigger using op-amp IC 741.
8. Astable and Monostable multivibrator using NE555 timer.
9. DC power supply using LM 317 and LM 723.
10. PLL use as frequency multiplier.
11. R-2R ladder type D-A converter using op-amp.

SIMULATION USING SPICE

12. Simulation of Active low pass filter, High Pass filter and Band pass filter using Op-Amp.
13. Simulation of Astable and Monostable multivibrator using NE555 timer and IC 741.

TOTAL: 45 PERIODS

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Construct integrator, differentiator and amplifier using Op-amp 741.
- Analyze the applications of an Op-amp: Filters and Oscillators.
- Build multivibrators using special application IC555 and general purpose Op-amp.
- Construct digital to analog converter.
- Demonstrate the function of application specific ICs such as voltage regulators LM317 and LM723, applications of PLL in communication.
- Analyze the Op-amp applications using SPICE.

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:

1) CRO/DSO – 15 Nos.
2) Signal Generator / Function Generators – 15 Nos.
3) Dual Regulated Power Supplies – 15 Nos.
4) Digital Multimeter – 15 Nos.
5) IC Tester – 5 Nos.
6) Desktop PC – 15 Nos.
7) SPICE Circuit Simulation Software: (any public domain or commercial software)
8) Components and Accessories: Resistors, Capacitors, Diodes, Bread Boards.

Note: Op-Amps uA741, LM317, LM723, NE555, NE565 may be used.

20HS4L1	PROFESSIONAL COMMUNICATION AND TECHNICAL PRESENTATION	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To impart the practical approach in learning and enhancing communication skill among engineering students.
- To identify appropriate expressions in speaking and writing.
- To understand the style and perfection of language in reading and listening various contexts of engineering and technology.
- To gain confidence for everyday communication, technical presentation, aptitude test and interviews.

UNIT - I Listening **6**

Listen and takes notes of Lecture, Talks on Engineering and Technology, Developing effective listening skills, barriers to effective listening, Listening self-Introduction Videos

UNIT - II Speaking **6**

Self-Introduction, Introduce oneself to the audience, Sharing memorable incidents, Individual presentation practice, Introduction to Group Discussion, GD strategies - activities to improve GD skills

UNIT - III Reading **6**

Reading Online Blogs, Reading Advertisement in Online, Newspaper archives reading, Reading FAQ's related to job Interview, General awareness of current affairs

UNIT - IV Writing **6**

Process Description, Narrating experiences, Creating Email blogs, Review Writing – Books, Movies, and Journals, Job Application Letter, Resume Writing

UNIT - V Summarized Activities **6**

Reading: Cloze exercises, Identifying redundant words, Jargon words, Foreign words, Technical terms

Writing: Error free sentences, Essay writing on various levels – basic, middle, and advanced, Preparing Job application letter and Resume

Speaking: Face to face conversation on specific topics, Answering Interview Questions, Panel Interview, Participating in Group Discussions, Technical Presentation

TECHNICAL PRESENTATION **15**

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

- Listen and Respond global English appropriately.
- Participate in group discussions towards placement drive.
- Communicate with effective technological skills.
- Read and Write the context cohesively and coherently and organize ideas logically in workplace situations.
- Attend job interviews and be successful in them.
- Make effective presentations of technical topics.

TEXT BOOKS:

1. E.Suresh Kumar, B.Sandhya, J.Savithri andP.Sreehari, "Communication for Professional Success", Orient Blackswan Private Limited, New Delhi, 2013.

REFERENCES:

1. Jeff Butterfield, "Soft Skills of Everyone", Cengage Learning, 1st Edition, 2011.
2. OBS Exports, "Interact English Lab Manual for Undergraduate Students", Orient BlackSwan, 2018.
3. Meenakshi Raman and Sangeetha Sharma, "Professional Communication", Oxford University Press, 2018.
4. S.Hariharan, N.Sundararajan and S.P.Shanmuga Priya, "Soft Skills", MJP Publishers, 2013.