S.A ENGINEERING COLLEGE, CHENNAI – 77

(An Autonomous Institution, Affiliated to Anna University)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATION-2020
CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR B.E ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER I								
Sl.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1	**HS1101**	Technical English	**HS**	**3**	**3**	**0**	**0**	**3**
2	**MA1101**	Calculus And Its Applications	**BS**	**4**	**3**	**1**	**0**	**4**
3	**PH1101**	Applied Physics	**BS**	**3**	**3**	**0**	**0**	**3**
4	**CY1101**	Engineering Chemistry	**BS**	**3**	**3**	**0**	**0**	**3**
5	**CS1101**	Problem Solving and Python Programming	**ES**	**3**	**3**	**0**	**0**	**3**
6	**ME1101**	Engineering Graphics	**ES**	**4**	**2**	**0**	**2**	**3**
PRACTICAL								
7	**BS1101**	Physics and Chemistry Laboratory	**BS**	**4**	**0**	**0**	**4**	**2**
8	**CS1102**	Problem Solving and Python Programming Laboratory	**ES**	**4**	**0**	**0**	**4**	**2**
MANDATORY COURSE								
9	**CI1101**	Indian Constitution	**MC**	**2**	**2**	**0**	**0**	**0**
			TOTAL	**30**	**19**	**1**	**10**	**23**

SEMESTER II								
Sl.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY								
1	**HS1201**	English for Communication	**HS**	**3**	**3**	**0**	**0**	**3**
2	**MA1201**	Complex Variables and Transforms	**BS**	**4**	**3**	**1**	**0**	**4**
3	**PH1201**	Materials Science	**BS**	**3**	**3**	**0**	**0**	**3**
4	**EE1203**	Basic Electrical and Instrumentation Engineering	**ES**	**3**	**3**	**0**	**0**	**3**
5	**EC1201**	Network Analysis and Synthesis	**PC**	**3**	**3**	**0**	**0**	**3**
6	**CS1201**	Programming in C	**PC**	**3**	**3**	**0**	**0**	**3**
PRACTICAL								
7	**CS1203**	C Programming Laboratory	**PC**	**4**	**0**	**0**	**4**	**2**
8	**GE1201**	Engineering Practice Laboratory	**ES**	**4**	**0**	**0**	**4**	**2**
MANDATORY COURSE								
9	**CY1201**	Environmental Science and Engineering	**MC**	**2**	**2**	**0**	**0**	**0**
			TOTAL	**29**	**20**	**1**	**8**	**23**

SEMESTER III								
Sl.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
	THEORY							
1	**MA1301**	Linear Algebra & Partial Diff. Equations	**BS**	**4**	**3**	**1**	**0**	**4**
2	**CS1301**	Object Oriented programming	**PC**	**3**	**3**	**0**	**0**	**3**
3	**EC1301**	Electronic Devices and Circuits	**ES**	**3**	**2**	**1**	**0**	**3**
4	**EC1302**	Signals and Systems	**PC**	**4**	**3**	**0**	**0**	**3**
5	**EC1303**	Digital System Design	**PC**	**3**	**3**	**0**	**0**	**3**
6	**EC1304**	Control Systems	**PC**	**4**	**3**	**0**	**0**	**3**
	PRACTICALS							
7	**EC1305**	Analog and Digital Circuits Laboratory	**PC**	**4**	**0**	**0**	**4**	**2**
8	**HS1301**	Interpersonal Skills / Listening & Speaking	**EEC**	**2**	**0**	**0**	**2**	**1**
9	**CS1303**	Object Oriented Programming Laboratory	**ES**	**4**	**0**	**0**	**4**	**2**
			TOTAL	**32**		**4**	**10**	**24**

SEMESTER IV								
Sl.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
	THEORY							
1	**EC1401**	Electronic Circuits Design	**PC**	**3**	**3**	**0**	**0**	**3**
2	**EC1402**	Electromagnetic Fields	**PC**	**4**	**3**	**1**	**0**	**4**
3	**EC1403**	Linear Integrated Circuits	**PC**	**3**	**3**	**0**	**0**	**3**
4	**MA1401**	Probability and Random Process	**BS**	**4**	**3**	**1**	**0**	**4**
5	**CS1401**	Data Structures and Algorithm	**PC**	**3**	**3**	**0**	**0**	**3**
6	**HV1401**	Universal Human Values in Education	**MC**	**3**	**3**	**0**	**0**	**3**
	PRACTICALS							
7	**EC1404**	Circuits Design and Simulation Laboratory	**PC**	**4**	**0**	**0**	**4**	**2**
8	**EC1405**	Linear Integrated Circuits Lab	**PC**	**4**	**0**	**0**	**4**	**2**
9	**EC1406**	Technical Seminar/Mini Project	**EEC**	**4**	**0**	**0**	**2**	**2**
			TOTAL	**29**	**18**	**3**	**10**	**23**

	SEMESTER V							
Sl.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
	THEORY							
1	**EC1501**	Communication Systems	**PC**	**3**	**3**	**0**	**0**	**3**
2	**EC1502**	Discrete Time Signal Processing	**PC**	**4**	**3**	**1**	**0**	**4**
3	**EC1503**	Microprocessor And Microcontroller	**PC**	**3**	**3**	**0**	**0**	**3**
4	**EC1504**	Wave Guides and Antenna Theory	**PC**	**4**	**3**	**1**	**0**	**4**
5		Elective-I(PE)	**PE**	**3**	**3**	**0**	**0**	**3**
	PRACTICALS							
6	**EC1505**	Discrete Time Signal Processing Laboratory	**PC**	**4**	**0**	**0**	**4**	**2**
7	**EC1506**	Communication Systems Laboratory	**PC**	**4**	**0**	**0**	**4**	**2**
8	**EC1507**	Microprocessor Laboratory	**PC**	**4**	**0**	**0**	**2**	**2**
			TOTAL	**29**	**18**	**3**	**10**	**23**

	SEMESTER V PROFESSIONAL ELECTIVE(PE)							
Sl.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
	THEORY							
1	**EC1508**	Medical Electronics	**PE**	**3**	**3**	**0**	**0**	**3**
2	**EC1509**	Advanced Digital System Design	**PE**	**3**	**3**	**0**	**0**	**3**
3	**EC1510**	Computer Architecture And Organization	**PE**	**3**	**3**	**0**	**0**	**3**
4	**EC1511**	Product Design and Development	**PE**	**3**	**3**	**0**	**0**	**3**
5	**EC1512**	Mixed Signal IC Design	**PE**	**3**	**3**	**0**	**0**	**3**

HS1101 **TECHNICAL ENGLISH** **L-T-P-C**

3-0-0-3

Prerequisites: Basic Language Proficiency.

OBJECTIVES:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Nurture their ability in technical writing like to prepare professional job applications and effective reports.
- Develop their speaking skills by participating in various speaking activities.
- Strengthen their listening skill to comprehend lectures and talks in their areas of specialization.
- Improve their ability to explicit their excellence in all modes of technical communication.

COURSE OUTCOMES:

The Students will be able to

CO1: Read technical texts and write area- specific texts effortlessly.
CO2: Listen and comprehend lectures and talks in their area of specialization successfully.
CO3: Speak appropriately and effectively in varied formal and informal contexts.
CO4: Write correctly, clearly and concisely with coherence and cohesion.
CO5: Prepare job applications and resume in an inspiring manner.

UNIT – 1 **9**

Reading- Reading short texts **Listening**- Listening to different formal / informal conversations **Writing**- Instructions, Jumbled sentences **Speaking**- Self introduction **Language development**- Parts of speech, Prepositions **Vocabulary development-** Word formation- root words from foreign language and their use in English.

UNIT – 2 **9**

Reading-Skimming and Scanning to find specific information **Listening**- Listening to INK talks **Writing**- Job Application – cover letter, resume writing **Speaking**- Asking and Giving directions **Language development**- Conjunctions, Types of Nouns **Vocabulary development-** Prefixes and Suffixes.

UNIT – 3 **9**

Reading- Reading for predicting the content **Listening**- Listening to situational short talks **Writing**- Types of paragraphs- Descriptive/Analytical/ compare and contrast **Speaking**- Mini presentations, Expressing greeting and thanks **Language development**- Adjectives, Numerical Adjectives, Conditional Clauses **Vocabulary development-** Homophones, Homonyms.

UNIT – 4 **9**

Reading- Practice in speed reading **Listening**- Listening to short texts and fill the data **Writing**- Interpretation of Graphics / Information, Note making **Speaking**-Contributing for Group Discussion **Language development**- Active, Passive, Impersonal passive voice **Vocabulary development**- Definitions, Nominal Compounds.

UNIT – 5 **9**

Reading- Reading short stories **Listening**- Listening for note taking **Writing**- Report writing, E-mail Writing **Speaking**- Picture descriptions, Speaking in familiar situations **Language development**- Tenses **Vocabulary development**- British and American Vocabulary.

TOTAL PERIODS : 45

TEXT BOOKS :

1. Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.
2. Board of editors. Fluency in English A Course book for Engineering and Technology.Orient Blackswan, Hyderabad: 2016.

EXTENSIVE READING :

1. Khera, Shiv. You can Win, Macmillan, 2000.

REFERENCE :

1. Bailey, Stephen. Academic Writing: A practical guide for students. New York:Rutledge,2011.
2. Comfort, Jeremy, et al. Speaking Effectively : Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011
3. Darlene Smith-Worthington, Sue Jefferson, Technical writing for Success, South-Western Cengage Learning,USA-2011
4. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007
5. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice.Oxford University Press: New Delhi, 2014
6. Swan Michael, Practical English Usage. Oxford University Press, Eighth impression 2002.

RECOMMENDED WEBSITES :

bbc.co.uk/1learning english
oxfordonlineenglish.com/
cambridgeenglish.org
inktalks.com/talks/
manageyourwriting.com

MA1101 CALCULUS AND ITS APPLICATIONS L T P C
3 1 0 4

OBJECTIVES:

- To understand the concepts of limits, continuity, differentiation and use it to find maxima and minima of functions of one variable.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations of first and second order that model in various engineering problems.
- To familiarize the student with functions of several variables that is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I- DIFFERENTIAL CALCULUS 9+3

Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rules – Maxima and Minima of functions of one variable.

UNIT II -ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER WITH APPLICATIONS: 9+3

Basic concepts- Separable differential equations - Exact differential equations - Integrating factors - Linear differential equations - Bernoulli's equation - Geometric Applications- Orthogonal trajectories - Physical Applications - Simple electronic circuits-Newton law of cooling-Heat flow-Rate of decay of radioactive materials-Chemical reaction and solutions.

UNIT III - DIFFERENTIAL EQUATIONS 9+3

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 - Method of undetermined coefficients.

UNIT IV- FUNCTIONS OF SEVERAL VARIABLES 9+3

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 V- MULTIPLE INTEGRALS 9+3

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

TOTAL PERIODS:60

COURSE OUTCOMES:

After completing this course, students should demonstrate competency in the following skills:

1. Use both the limit definition and rules of differentiation to differentiate functions. Apply differentiation to solve maxima and minima problems.
2. The subject helps the students to develop the fundamentals and basic concepts in ODE
3. Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

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TEXTBOOKS:

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

REFERENCE BOOKS:

1. Bali,N.P.,Goyal,M.,Watkins,C.,Advanced Engineering Mathematics,Laxmi Publications Pvt. Limited, 2007.
2. Boyce,W.E.,and DiPrima,R.C.,Elementary Differential Equationsand Boundary Value Problems, Wiley India, 2012.
3. O'Neil. P. V., "Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.
4. T.Veerarajan , Engineering Mathematics , Mc Grawhill Publications , New Delhi 2017.

PH1101	APPLIED PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

UNIT-1 PROPERTIES OF MATTER **9**

Elasticity- plasticity – Different Types of Stress and Strain- concept of stress-strain diagram and its application - three types of modulus of elasticity- Poisson's Ratio – Bending of beams- Expression for bending moment –- young's modulus uniform and Non uniform bending : Theory and Experiment – I Shape girders – **Torsional oscillation Theory and Experiment-** Application of Elastic Materials.

UNIT-2 APPLIED OPTICS **9**

Laser : characteristics of laser - Principle of spontaneous emission and stimulated emission – Laser action – Einstein A & B coefficients - Population inversion - Pumping – Basic requirement of laser – Types of laser : Nd-YAG and CO_2 – Applications : Welding , Drilling & Cutting – Medical field

Fiber optics: **Introduction**- Principle and propagation of light – Numerical aperture and acceptance angle – classification of optical fibers – **Losses in optical fibers(Qualitative) –** Fiber optics communication system (Block Diagram) – Advantages with fiber optic communication system.

UNIT-3 THERMAL PHYSICS **9**

Modes of heat transfer- thermal conduction, convection and radiation – Specific heat capacity- thermal conductivity- Newton's law of cooling - **Searle's** and Lee's disc methods: theory and experiment - conduction through compound media (series and parallel) – **thermal expansion of solids, liquids and gases** - Applications: heat exchangers, refrigerators and solar water heaters.

UNIT-4 WAVE AND PARTICLE PHYSICS **9**

Inadequacy of Classical Mechanics - Development of quantum theory- **Planck's Black body radiation and Distribution Laws(Qualitative) – Compton Effect (Derivation)** - De Broglie wavelength – properties of matter waves – Experimental Verification (G.P Thomson experiment) – Heisenberg's uncertainty principle - Schrodinger's wave equation – time dependent – time independent wave equations – physical significance of Wave function – applications: particle in a one dimensional potential box.

UNIT-5 CRYSTALOGRAPHY **9**

Single crystalline, polycrystalline and amorphous materials Lattice - unit cell- Crystal systems-Bravais lattices- Lattice planes- Miller indices- Interplanar- d- Spacing in cubic Lattice- calculation of number of atoms per unit cell – atomic radius – packing factor for SC, BCC, FCC and HCP structures- **Crystal Defects – types.**

Total Periods : 45

COURSE OUTCOMES:

At the end of this course,

1. The students will gain knowledge on the basics of properties of matter and its applications
2. Use the concepts of waves and optical devices and their applications in Laser and fiber optics
3. The students will understand the properties of thermal materials and its applications
4. The students will get knowledge on advanced physics concepts of quantum theory and its application in one dimensional box.
5. The students will understand the different types of crystals structures and different crystal growth techniques.

TEXT BOOKS :

1. Gupta S.L. and Sanjeev Gupta, Modern Engineering Physics , Dhanpat Rai Publishers, 2015.
2. R. K. Gaur and S.C. Gupta, Engineering Physics, Dhanpat Rai Publication (P) Ltd, New Delhi, 2014.
3. Bhattacharya, D.K. and Poonam, T. Engineering Physics, Oxford University Press, 2015.

REFERENCES :

1. C. Kittel ,Introduction to Solid State Physics 8th Edition , Wiley Eastern Ltd,2004.
2. Halliday, D., Resnick, R. and Walker, J. Principles of Physics. Wiley, 2015.
3. Tipler, P.A. and Mosca, G. Physics for Scientists and Engineers with Modern Physics, W.H.Freeman, 2007.
4. Einstein coefficient calculation,https://youtu.be/TvfiZHXUtXg (Video lecture)
5. Lattice structures, https://youtu.be/Rm-i1c7zr6Q (Video lecture)

CY1101 ENGINEERING CHEMISTRY L T P C

3 0 0 3

OBJECTIVES:

1. To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
2. To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
3. It enables the students to gain information about Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells
4. It deals with the information about the types of fuels, calorific value calculations and manufacture of solid, liquid and gaseous fuels.
5. To impart knowledge about the nanomaterial's synthesis, properties and applications

UNIT I WATER TREATMENT AND TECHNOLOGY 9

Introduction – characteristics, Water quality parameters -hardness– types, Determination-EDTA method, Alkalinity ,boiler feed water requirements-boiler troubles – scale & sludge - Caustic Embrittlement , boiler explosion -softening of hard water - external treatment process - demineralization and zeolite, internal treatment - boiler compounds (phosphate, calgon, carbonate and colloidal conditioning methods) – desalination of brackish water –reverse osmosis.

UNIT II PHASE RULE AND ALLOYS 9

Phase rule: Introduction, definition of terms with examples, One Component System- water system,Sulphur,CO_2 system, Thermal Analysis and cooling curves, Reduced phase rule - Two Component Systems- classification – lead-silver system-problems. Alloys: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel.

UNIT III ENERGY SOURCES AND STORAGE DEVICES 9

Energy – Types – Non-renewable energy - Nuclear energy -renewable energy - solar energy conversion - solar cells. Introduction to Electrochemistry, Nernst Equation-Electrochemical cells – reversible and irreversible cells –Cell construction and representation - Batteries -types of batteries – characteristics – construction and working of primary battery (dry cell) - secondary battery (lithium-ion-battery) - fuel cells (H_2-O_2).

UNIT IV FUELS AND COMBUSTION 9

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal- analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) – petroleum- manufacture of synthetic petrol (Bergius process)- knocking- octane number – diesel oil- cetane number – natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG)- producer gas- water gas. Power alcohol and bio diesel. Combustion of fuels: introduction- theoretical calculation of calorific value- ignition temperature- explosive range – flue gas analysis (ORSAT Method).

UNIT V NANOCHEMISTRY **9**

Basics - distinction between nanoparticles and bulk materials; size-dependent properties., Nano cluster, Nano rod, nanotube(CNT)-Types of CNT and nanowire. Synthesis: precipitation, thermolysis, chemical vapour deposition, Properties, Characterization and applications.

TOTAL PERIODS:45

COURSE OUTCOMES:

1. The knowledge gained on water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.
2. With the help of phase rule, they could understand the various phase diagrams and able to predict the low melting alloys.
3. Students can get knowledge about various fuels and its applications based on its calorific value.
4. It provides the students to understand about conventional and non-conventional energy sources and its applications
5. Students gain an insight about the recent trends in nano materials.

TEXT BOOKS :

1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010

REFERENCES :

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
3. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

CS1101 PROBLEM SOLVING AND PYTHON PROGRAMMING **L T P C**
3 0 0 3

OBJECTIVES:

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING **9**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS **9**

Python interpreter and interactive mode; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS **9**

Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES **9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V FILES, MODULES, PACKAGES & TURTLE **9**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file- **Case study: Simple Graphics using Turtle**: Draw a Random Pattern of Circle, Square and Rectangle; Draw a Pattern of Straight Lines, **Plotting Graphs in Python**: Menu Driven Program to Create Mathematical 3D Objects.

TOTAL PERIODS: 45

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Develop algorithmic solutions to simple computational problems
2. Read, write, execute by hand simple Python programs.
3. Structure simple Python programs for solving problems.
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, dictionaries.
6. Read and write data from/to files in Python Programs.

TEXT BOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)
2. Reema Thareja, Problem Solving and Programming with python, 2nd edition, Oxford University press, 2019.
3. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013.
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

ME1101 **ENGINEERING GRAPHICS** **L T P C**

2 0 2 3

OBJECTIVES:

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

CONCEPTS AND CONVENTIONS (Not for Examination) **1**

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

UNIT-I PLANE CURVES AND ORTHOGRAPHIC PROJECTIONS **6+6**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization principles – Layout of views- Orthographic projection of multiple views(Free Hand Sketching) from pictorial views of objects-Principal planes-Projection of points-Demo using CAD software for above topics.

UNIT-II PROJECTION OF POINTS STRAIGHT LINES AND PLANE SURFACES **6+6**

Orthographic projections-principles-Principal planes-First angle projection-Projection of points-Projection of straight lines (only First angle projections) inclined to one of the principal planes Determination of true lengths and true inclinations - Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes - Demo using CAD software for above topics.

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-Demo using CAD software for above topics.

UNIT-IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENTOF SURFACES **6+6**

Sectioning of above solids in simple vertical position - the cutting plane is inclined to the 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 cylinders and cones-Demo using CAD software for above topics.

UNITV ISOMETRIC AND PERSPECTIVE PROJECTIONS **6+6**

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated

solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions –Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method-Demo using CAD software for above topics.

TOTAL: 61 PERIODS

COURSE OUTCOMES:

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

1. Familiarize with the fundamentals and standards of Engineering graphics
2. Perform freehand sketching of basic geometrical constructions and multiple views of objects.
3. Project orthographic projections of lines and plane surfaces.
4. Draw projections of solids and development of surfaces.
5. Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

1. NatrajanK.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai,2009.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

REFERENCES:

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

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 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

SPECIAL POINTS APPLICABLE TO UNIVERSITY EXAMINATIONS ON ENGINEERING GRAPHICS:

1. There will be five questions, each of either-or type covering all units of thesyllabus.
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 A3size.
4. The examination will be conducted in appropriate sessions on the same day

BS1101 **PHYSICS AND CHEMISTRY LABORATORY** **L T P C**

0 0 4 2

PHYSICS LABORATORY

OBJECTIVES:

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

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young‘s modulus by non-uniform bending method
3. (a) Determination of wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
4. Determination of thermal conductivity of a bad conductor – Lee‘s Disc method.
5. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
6. Determination of wavelength of mercury spectrum – spectrometer grating
7. Determination of band gap of a semiconductor
8. Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

COURSE OUTCOMES:

1. Upon completion of the course, the students will be able to apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY

OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

LIST OF EXPERIMENTS (**Any seven experiments to be conducted)**

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler‘s method.
4. Determination of TDS of water sample.
5. Determination of strength of acids in a mixture of acids using conductivity meter.
6. Estimation of iron content of the given solution using potentiometer.
7. Estimation of iron content of the water sample using spectrophotometer (1, 10- Phenanthroline / thiocyanate method).
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Conductometric titration of strong acid vs strong base.

TOTAL PERIODS: 30

COURSE OUTCOMES:

1. The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

CS1102 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C

0 0 4 2

OBJECTIVES:

1. To study python programs with conditionals and loops
2. To use functions for python structured programs.
3. Use strings for structuring Python programs.
4. Represent compound data using Python lists, tuples, and dictionaries.
5. To read and write data from and to files in python.

LIST OF EXPERIMENTS:

1. Write a program to display the largest number among three numbers.
2. Write a program to display the Fibonacci series by using looping constructs.
3. Write a function to compute the GCD of two numbers.
4. Explore String Functions
5. With the help of strings, array or list, display a simple calendar in python program without using the calendar module.
6. With the help of list perform linear search and Binary search.
7. Write a program to perform Selection sort, Insertion sort, Merge sort
8. Create a text file using python file I/O. Read the content of the file and change them from lower to upper case characters.
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file
11. Simulate bouncing ball using Pygame

TOTAL PERIODS: 60

COURSE OUTCOMES:

1. Design simple programs using conditionals and loops.
2. Write functions to solve mathematical problems
3. Use strings for structuring Python programs.
4. Represent compound data using Python lists, tuples, and dictionaries.
5. Identify to read and write data from and to files in python.

CI1101 **INDIAN CONSTITUTION** **L T P C**

2 0 0 0

PREREQUISITES: Basic law.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

COURSE CONTENT:

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

HS1201 **ENGLISH FOR COMMUNICATION** **L T P C**

4 0 0 3

OBJECTIVES:

The Course enables the second semester Engineering and Technology students to:

1. Improve their language ability to improve the four basic skills of communication (LSRW).
2. Enhance the skills and methods to enrich their reading and comprehending ability.
3. Strengthen their skills to listen to the lectures and talks related to their fields of studies.
4. Foster their ability to write effectively in all contexts.
5. Cultivate their oral presentation skills through technical presentations and contribution in group discussions.

COURSE OUTCOMES:

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

CO1: Read for comprehending and responding in general and professional settings.
CO2: Demonstrate the communication skills (LSRW) in academic, professional and social Environment.
CO3: Participate effectively in formal and informal conversations and express findings and opinions with proper language ability.
CO4: Comprehend conversations and short talks delivered in English.
CO5: Use the language effectively to write with clarity and accuracy in general and technical contexts.

UNIT – 1 **9**

Reading- Reading for detailed comparison **Listening**- Listening to interviews **Writing**- Developing hints, summarizing **Speaking**- Talk about future plans, arrangements intensions **Language development**- Sentence structures **Vocabulary development**- Synonyms, Antonyms, Adverbs

UNIT – 2 **9**

Reading-Extended reading **Listening**- Listening to telephonic conversations **Writing**- Formal Letter Writing - Letters for bona fide certificate - to the principal for permission for in plant training, industrial visit, paper presentations, inter college events, Letter to the Editor, Recommendations **Speaking**- Formal conversation **Language development**-Use of Punctuation, Modal verbs **Vocabulary development**- One word substitutes, Common Phrasal verbs

UNIT – 3 **9**

Reading- Identify topic sentences by reading a short story **Listening**- Listening to TED talks **Writing**- Process/product description **Speaking**- Formal Conversations **Language development**- Relative Clauses, Concord, Error correction **Vocabulary development**- Idioms & Phrases, Minimal pairs

UNIT – 4 **9**

Reading- Reading newspaper articles **Listening**- Listening to inspirational speeches **Writing**- Essays, Checklist **Speaking**- Technical Presentations **Language development**- Degrees of Comparison **Vocabulary development**- Articles, Cause and Effect Expressions

UNIT – 5 **9**

Reading- Close reading **Listening**- Listening for summarizing **Writing**- Dialogue conversations **Speaking**- Movie/ Book Review **Language development**- Wh Questions, Yes/ no Questions **Vocabulary development**- Foreign Expressions and its applications, Reference words

TOTAL PERIODS: 45

EXTENSIVE READING:

1. Kalam, Abdul Dr.A.P.J. - The Wings of Fire, Universities press: 1999

REFERENCE:

1. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
3. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
4. Dutt P. Kiranmai and RajeevanGeeta. Basic Communication Skills, Foundation Books: 2013
5. Means,L. Thomas and Elaine Langlois. English & Communication For Colleges.CengageLearning ,USA: 2007.

RECOMMENDED WEBSITES:

1. TED.com
2. learningenglish.voanews.com
3. islcollective.com
4. examenglish.com
5. englishclass101.com

MA1201 COMPLEX VARIABLES AND TRANSFORMS L T P C

3 1 0 4

OBJECTIVES :

6. Understand the concept of Divergence and curl and use it in evaluating Line, Surface and Volume integrals.
7. Understand C-R equations and use it in the construction of Analytic Functions.
8. Understand the methods of Complex Integration using Cauchy's Integral Formula and Cauchy Residue theorem, finding Taylor's and Laurent's Series expansions.
9. Find the Laplace Transforms of standard Functions and to find the Inverse Laplace Transform of a function and use it in solving Differential Equations.
10. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems

UNIT I VECTOR CALCULUS 9 + 3

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-simple applications involving cubes and rectangular parallelopipeds.

UNIT II ANALYTIC FUNCTIONS 9 + 3

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 ($w = 1/z$, $w = z^2$, $w = e^z$, $w = \sinh z, w = \cosh z$) – Bilinear transformation.

UNIT III COMPLEX INTEGRATION 9 + 3

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 and semicircular contour.

UNIT IV LAPLACE TRANSFORMS 9 + 3

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 V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 9 + 3

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

TOTAL PERIODS : 60

COURSE OUTCOMES:

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

1. Solve problems using divergence and curl and evaluate line, Surface and Volume integrals.
2. Solve problems in Analytic functions and construction of analytic functions using C-R Equations.
3. Evaluate problems using Cauchy's integral formula and Cauchy residue theorem and find Taylor's and Laurent's series expansion of a given function.
4. Obtain the Laplace Transforms of standard functions.
5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

TEXTBOOKS

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

REFERENCE BOOKS

1. Bali,N.P.,Goyal,M.,Watkins,C.,Advanced Engineering Mathematics,Laxmi Publications Pvt. Limited, 2007.
2. Boyce,W.E.,andDiPrima,R.C.,ElementaryDifferentialEquationsandBoundary Value Problems, Wiley India, 2012.
3. O'Neil. P. V. "Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.
4.T. Veerarajan, Engineering Mathematics, Tata Mcgraw Hill publications co. ltd, New Delhi.2017.

PH1201 **MATERIAL SCIENCE** **L T P C**
3 0 0 3

OBJECTIVES:

To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS 9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity –Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory –Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states –carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination –Elemental and Compound Semiconductors – **N-type and P-type semiconductor (Qualitative)** – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism –Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials –Ferrites and its applications. **Electro static Discharge (ESD)**-Superconductivity: properties – Type I and Type II superconductors–BCS theory of superconductivity (Qualitative) - High Tc superconductors – Electrical, medical, magnetic and computer application of superconductors.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientation and space charge polarization – frequency and temperature dependence of polarisation – **Clausius mosotti relation -** dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer).

UNIT V ADVANCED ENGINEERING MATERIALS 9

Metallic glasses - melt spinning process, applications - shape memory alloys: Ni-Ti alloy, applications – nanomaterials: preparation (bottom up and top down approaches), properties and applications- Bio materials – introduction- properties of bio materials-examples- medical applications- Ophthalmology- bio sensors-characteristics.

TOTAL PERIODS: 45

COURSE OUTCOMES:

At the end of this course,

1. The students will gain knowledge of conducting materials and variation of its properties with temperature.
2. Acquire knowledge on basics of semiconductor physics and its applications in various devices.
3. Get knowledge on magnetic and superconducting materials properties and their various applications.
4. The students will understand the basics of dielectric materials, properties and applications of dielectric materials.
5. The students will get knowledge about new engineering materials and its applications in social applications.

TEXT BOOKS:

1. S.Mohan, Principles of Materials Science, MJP Publishers, 2018.
2. Jasprit Singh, Semiconductor Devices, Basic Principles, Wiley 2012.
3. Umesh K Mishra and Jasprit Singh, Semiconductor Device Physics and Design, Springer, 2008.

REFERENCES:

1. Wahab, M.A. Solid State Physics: Structure and Properties of Materials, Narosa Publishing House, 2009.
2. William D.Callister Jr, David G. Rethwisch, Materials Science and Engineering, An Introduction, Wiley India (P) Ltd., 8th Edition, 2009.
3. Pillai S.O., Solid State Physics, New Age International (P) Ltd., Publishers, 2009.
4. Semiconductor Introduction, https://youtu.be/k6ZxP9Yr02E (Video lecture)
5. Superconductivity, https://youtu.be/D-9M3GWOBrw (Video lecture)

EE1203 BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

To impart knowledge on

- Operation and working of transformer and their types.
- Construction, working principle and applications of AC and DC machines.
- Construction, working principle and applications of special electrical machines.
- Three phase electrical circuits and power measurement
- Working principle of Various measuring instruments

UNIT I TRANSFORMER 9

Introduction - Ideal Transformer – Construction and working principle of single phase and three phase transformer, Auto Transformers, Instrument transformers, high frequency transformer, Voltage Regulation – Efficiency – All day efficiency – Applications.

UNIT II AC AND DC MACHINES 9

Construction and working of three-phase induction motors, Single phase Induction motors, Alternator, Synchronous motors- Construction of DC machines - Motoring and generation principle - Emf And Torque equation – Applications of AC and DC machines.

UNIT III SPECIAL ELECTRICALMACHINES 9

Construction and working principle of Universal Motor- Stepper Motors – Brushless DC Motors- Permanent magnet DC motor -Permanent magnet synchronous motor -Linear Induction Motor – Applications of special electrical machines.

UNIT IV THREE PHASE CIRCUITS 9

Three phase power supply – Star connection – Delta connection – Balanced and Unbalanced Loads-Power equation – Star Delta Conversion – power factor -Three Phase Power Measurement -Two wattmeter method.

UNIT V MEASUREMENT AND INSTRUMENTATION 9

Principles of Electrical Instruments (PMMC and MI) –Multimeters, Oscilloscopes- Transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect - Digital instruments (DSO and Power recorders).

TOTAL PERIODS: 45

COURSE OUTCOMES:

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

1. Understand the working principle of transformers and their applications.
2. Understand the working principle of AC and DC machines.
3. Understand the working principle of Special electrical machines
4. Understand the concept of three phase power circuits and measurement.
5. Understand the use of measuring instruments for different applications.

TEXT BOOKS:

1. D P Kothari and I.J Nagarath, ―Basic Electrical and Electronics Engineering, McGraw Hill Education(India) Private Limited, Third Reprint ,2016
2. Giorgio Rizzoni, ―Principles and Applications of Electrical Engineering, McGraw Hill Education(India) Private Limited, 2010
3. S.K.Bhattacharya ―Basic Electrical and Electronics Engineering, Pearson India, 2011

REFERENCES:

1. Del Toro ,Electrical Engineering Fundamentals, Pearson Education, New Delhi, 2015.
2. Leonard S Bobrow, - Foundations of Electrical Engineering, Oxford University Press, 2013
3. Rajendra Prasad, Fundamentals of Electrical engineering, Prentice Hall of India, 2006.

EC1201 NETWORK ANALYSIS AND SYNTHESIS L T P C

3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of DC and AC circuits behavior.
- To introduce different methods of circuit analysis using Network theorems, duality and topology. To study the elements of network synthesis.

UNIT I BASIC CIRCUITS ANALYSIS AND NETWORK TOPOLOGY 9

Ohm's Law – Kirchhoff's laws – Mesh current and node voltage method of analysis for D.C and A.C. circuits - Network terminology - Graph of a network - Incidence and reduced incidence matrices;Trees –Cutsets - Fundamental cutsets - Cutset matrix – Tie sets - Link currents and Tie set schedules-Twig voltages and Cutset schedules, Duality and dual networks.

UNIT II NETWORK THEOREMS FOR DC AND AC CIRCUITS 9

Network theorems -Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, and Maximum power transfer theorem ,application of Network theorems- Network reduction: voltage and current division, source transformation – star delta conversion.

UNIT III RESONANCE AND COUPLED CIRCUITS 9

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. Self inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multiwinding coupled circuits - Series, Parallel connection of coupled inductors.

UNIT IV TWO PORT NETWORKS 9

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.

UNIT V ELEMENTS OF NETWORK SYNTHESIS 9

Reliablility of one port network-Hurwitz polynomials-PR functions-Necessary and sufficient conditions of PR functions-Properties of driving point impedence-Synthesis of LC,RL and RC driving point impedence.

TOTAL PERIODS : 45

COURSE OUTCOMES:

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

1. Develop the capacity to analyze electrical circuits,
2. Apply the circuit theorems in real time,
3. Analyze the frequency response of resonant circuits,
4. Analyze the frequency response of two port networks,
5. Analyze the elements of network synthesis.

TEXT BOOKS:

1. William H. Hayt, Jr. Jack E. Kemmerly and Steven M. Durbin, ―Engineering Circuit Analysis‖ , McGraw Hill Science Engineering, Eighth Edition, 11th Reprint 2016.
2. Joseph Edminister and Mahmood Nahvi, ―Electric Circuits‖, Schaum‘s Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.

REFERENCES:

1. A.Bruce Carlson, ―Cicuits: Engineering Concepts and Analysis of Linear Electric Circuits‖,Cengage Learning, India Edition 2nd Indian Reprint 2009.
2. Allan H.Robbins, Wilhelm C.Miller, ―Circuit Analysis Theory and Practice‖, Cengage Learning, Fifth Edition, 1st Indian Reprint 2013
3. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015.

CS1201 **PROGRAMMING IN C** **L T P C**

3 0 0 3

OBJECTIVE:

- To develop C Programs using basic programming constructs.
- To develop C programs using arrays and strings.
- To develop applications in C using functions and functions.
- To develop applications in C using structures.
- To do input/output and file handling in C.

UNIT I BASICS OF C PROGRAMMING **9**

Introduction to programming paradigms - Structure of C program - C programming: Identifiers- Keywords- Data Types - Variables - Constants. Operators: Precedence and Associativity - Expressions - Input/ Output statements - Decision making statements - Switch statement - Looping statements - Pre- processor directives - Compilation process

UNIT II ARRAYS AND STRINGS **8**

Introduction to Arrays: Declaration, Initialization - One dimensional array - Example Program: Computing Mean, Median and Mode - Two dimensional arrays - Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String- String operations – String Arrays.

UNIT Ill FUNCTIONS AND POINTERS **10**

Introduction to functions: Function prototype, - function definition, - function call, - Built-in functions (string functions, , math functions) - Recursion-Types of Recursion - Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions-Storage Classes - Pointers - Pointer operators - Null Pointers- Pointer arithmetic - Arrays and pointers - Array of pointers - Example Program: Sorting of names - Parameter passing: Pass by value, Pass by reference - Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV STRUCTURES **9**

Structures-Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to structures – Union - Programs using structures and Unions, Enumerated data type-Dynamic Memory Allocation.

UNITV FILE PROCESSING 9

Files - Types of file processing: Sequential access, Random access - Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Payroll System and Transaction processing using random access files - Command line arguments.

TOTAL PERIODS:45

COURSE OUTCOMES:

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

1. Develop simple applications in C using basic constructs
2. Design and implement applications using arrays and strings
3. Develop and implement applications in C using functions and pointers.
4. Develop applications in C using structures.
5. Design applications using sequential and random access file Processing.

TEXTBOOKS :

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition,Pearson Education, 2006

REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition,Pearson Publication
2. Juneja, B. Land Anita Seth, "Programming in C", CENGAGE Learning India pvt. Ltd.,2011
3. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C",McGraw-Hill Education, 1996.

CS1203 **PROGRAMMING IN C LABORATORY** **L T P C**
0 0 4 2

Course Objectives:-

- To develop programs in C using basic constructs.
- To develop programs in C using control statements.
- To develop applications in C using arrays, strings, pointers.
- To develop applications in C using functions, structures.
- To develop applications in C using file processing

1. Input and Output statements

2. Control statements – Branching & Looping

a) Write a C program to generate Pascal's triangle.

b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*,/,% and use Switch Statement)

c) Write a C program to find the sum of individual digits of a positive integer.

d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

e) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

f) Write a C program to swap Numbers Using Temporary Variables.

3. Arrays

a) Write a C program to search an array element using linear search.
b) Write a C program to find both the larges and smallest number in a list of integers.
c) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii)Multiplication of Two Matrices
d) Write a C program to implement Bubble sort.

4. Strings

a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to given main string from a given position.

ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not

5. Functions & Pointers:

Write C programs that use recursive functions

i) To find factorial of given number

ii) To solve Towers of Hanoi Problem.

iii) To swap the variables using call by value and call by reference.

6. a. Generate mark sheet of students using structures.

6. b. Compute salary slip for five employees using structures and functions.

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

TOTAL PERIODS:- 60

UPON COMPLETION OF THE COURSE, THE STUDENTS WILL BE ABLE TO

1. Develop C programs for simple applications making use of basic constructs
2. Develop C programs for control statements.
3. Develop C programs involving arrays, strings and pointers.
4. Develop C programs involving functions, and structures.
5. Design applications using sequential and random access file processing.

GE 1201 ENGINEERING PRACTICES LABORATORY L T P C

0 0 4 2

OBJECTIVES:

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

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13

Buildings:

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

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, Unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.

(c) Preparation of plumbing line sketches for water supply and sewage works.

(d) Hands-on-exercise: Basic pipe connections – Mixed pipe material connection –.pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

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

(b) Gas welding practice

Basic Machining:

(a) Simple Turning and Taper turning

(b) Drilling Practice Sheet Metal Work:

(a) Forming & Bending:

(b) Model making – Trays and funnels.

(c) Different type of joints. Machine assembly practice:

(a) Study of centrifugal pump

(b) Study of air conditioner Demonstration on:

(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.

(b) Foundry operations like mould preparation for gear and step cone pulley.

(c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP -B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.

2. Fluorescent lamp wiring.

3. Stair case wiring

4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.

5. Measurement of energy using single phase energy meter.

6. Measurement of resistance to earth of electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 16

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

TOTAL PERIODS : 60

COURSE OUTCOMES:

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

1. Fabricate carpentry components and pipe connections including plumbing works.
2. Use welding equipments to join the structures.
3. Carry out the basic machining operations
4. Make the models using sheet metal works
5. Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings
6. Carry out basic home electrical works and appliances
7. Measure the electrical quantities
8. Elaborate on the components, gates, soldering practices.

CY1201 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C

2 0 0 0

OBJECTIVES :

1. To understand nature and the facts about the environment.
2. To find and implement scientific, technological, economic and political solutions to environmental problems.
3. To study the interrelationship between living organism and environment.
4. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
5. To study the dynamic processes and understand the features of the earth's interior and surface.
6. To study the integrated themes and biodiversity, natural resources, pollution control and waste management

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of major ecosystem – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity – Biodiversity at global, national and local levels – India as a mega- diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground

water – Mineral resources: environmental effects of extracting and using mineral resources, case studies – Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – 12 Principles of Green chemistry, role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **7**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act –- central and state pollution control boards.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health.

TOTAL PERIODS: 45

COURSE OUTCOMES:

1. Students will be able to understand the functions of ecosystems and appreciate the bio diversity.
2. Students will be able to know the measures to control environmental pollution.
3. Students will be able to understand the usage as well as the effects of over exploitation of natural resources.
4. Students will have knowledge about finding technological, economic and political solutions to environmental problems with various Environmental Protection Act in mind.
5. Students will be able to understand the interrelationship between population explosion and the environment and also role of IT in environment and human health.
6. Students will be able to understand that Environmental problems can only be solved by Public participation in all aspects and cannot be solved by mere laws.

TEXT BOOKS

1. Environmental Science and Engineering by Anubha Kaushik and C.P.Kaushik-New Age International Publishers. New Delhi, 2017.

REFERENCES

1. Benny Joseph , Environmental Studies, Tata mcgraw-Hill Publishing Company, Ltd., New Delhi, 2006.
2. Dr.B.S.Chauhan,. Environmental Studies, University Science Press, New Delhi, 2011.

MA1301 LINEAR ALGEBRA AND PARTIALDIFFERENTIALEQUATIONS L T P C

4 0 0 4

OBJECTIVES:

- To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.
- To understand the concepts of vector space, linear transformations and diagonalization.
- To apply the concept of inner product spaces in orthogonalization.
- To understand the procedure to solve partial differential equations.
- To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

UNIT-I SYSTEM OF LINEAR EQUATION AND VECTOR SPACES 12

Basic Definition-Equivalent system-Elementary operation systems in Triangular and Echelon form-Gauss elimination- Solution of linear equation and Linear combination of vectors-Vector spaces – Examples of vector space Subspaces – Linear independence and linear dependence – Basis and dimensions.

UNIT-II LINEAR TRANSFORMATIONANDDIAGONALIZATION 12

Linear transformation - Null spaces and ranges - Dimension theorem –Isomorphism- Matrix representation of a linear transformations– change of basis- Eigenvalues and eigenvectors - Diagonalizability.

UNIT-III INNER PRODUCTSPACES 12

Inner product space-Examples of inner product space-Cauchy Schwartz inequality- Gram Schmidt orthogonalization process - Adjoint of linear operations –Self adjoint operator-Orthogonal and Unitaray operator-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 – 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

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

1. Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
2. Demonstrate accurate and efficient use of advanced algebraic techniques.
3. Demonstrate their mastery by solving non - trivial problems related to the concepts and by proving simple theorems about the statements proven by the text.
4. Able to solve various types of partial differential equations. Able to solve engineering problems using Fourier series.

TEXTBOOKS:

1. GrewalB.S.,-HigherEngineeringMathematics,KhannaPublishers,NewDelhi,43rdEdition, 2014.
2. Friedberg,A.H.,Insel,A.J.andSpence,L.,-LinearAlgebra‖,PrenticeHallofIndia,NewDelhi, 2004.

REFERENCES:

1. Burden, R.L. and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning,2016.
2. James,G.-Advanced ModernEngineeringMathematics‖, PearsonEducation,2007.
3. Kolman, B. Hill, D.R., -Introductory Linear Algebra‖, Pearson Education, New Delhi, First Reprint,2009.
4. Kumaresan, S., -Linear Algebra – A Geometric Approach‖, Prentice – Hall of India, New Delhi, Reprint,2010.
5. Lay,D.C.,-LinearAlgebra and its Applications‖, 5thEdition,PearsonEducation,2015.
6. O'Neil,P.V.,-AdvancedEngineeringMathematics‖,CengageLearning,2007.

CS1301 OBJECT ORIENTED PROGRAMMING L T P C

3 0 0 3

OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java –Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays, Packages.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, ArrayLists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNITIV MULTITHREADING AND GENERIC PROGRAMMING 8

Understanding Threads, Thread Priorities, Synchronizing Threads, Thread life cycle, Inter-thread communication. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations-Introduction to JDBC, JDBC Drivers and Architecture, Accessing Databse with JDBC.

UNIT V EVENT DRIVEN PROGRAMMING 9

Event-Driven Programming in Java, Event- Handling Process, Event Handling Mechanism, The Delegation Model of Event Handling, Event Classes, Event Sources, Event Listeners, Adapter Classes as Helper Classes in Event Handling. Introduction to Swing –Java Foundation Class- Swing GUI Components – Swing packages and Classes-Swing Control classes and Methods.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

1. Develop Java programs using OOP principles
2. Develop Java programs with the concepts of inheritance and interfaces
3. Build Java applications using exceptions and I/O streams
4. Design problems solutions using Generic Collections and Exception Handling
5. Create a Database connectivity and manipulate database using JDBC
6. Develop interactive Java programs using swings

TEXT BOOKS:

1. Herbert Schildt, ―Java The complete reference‖, 8th Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann, Gary cornell, ―Core Java Volume –I Fundamentals‖, 9th Edition, Prentice Hall, 2013.

REFERENCES:

1. Paul Deitel, Harvey Deitel, ―Java SE 8 for programmers‖, 3rd Edition, Pearson, 2015.
2. Steven Holzner, ―Java 2 Black book‖, Dreamtech press, 2011.
3. Timothy Budd, ―Understanding Object-oriented programming with Java‖, Updated Edition, Pearson Education, 2000.

EC1301 ELECTRONIC DEVICES AND CIRCUITS L T P C

3 1 0 4

OBJECTIVES :

- To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices.
- To introduce different biasing circuits, amplifiers and power supplies.

UNIT- I SEMICONDUCTOR DEVICES 9

PN diode Current equations, Diffusion and drift current densities, Switching Characteristics, NPN -PNP - Operations-Early effect-Current equations- Input and Output characteristics of CE, CB, CC.

UNIT- II FET AND SPECIAL SEMICONDUCTOR DEVICES 9

JFETs – Drain and Transfer characteristics, MOSFET- Characteristics- D-MOSFET, E-MOSFET-Characteristics, UJT, SCR, Diac, Triac, LDR- LED, LCD- OptoCoupler,CCD.

UNIT- III BIASING OF BJT AND FET CIRCUITS 9

BJT– Need for biasing - DC Load Line and Bias Point – DC analysis of Transistor circuits – Variousbiasing methods of BJT – Bias Circuit Design - Thermal stability - Stability factors – Bias compensation techniques using Diode, thermistor and sensistor – Biasing BJT Switching Circuits-JFET - DC Load Line and Bias Point - Various biasing methods of JFET - JFET Bias Circuit Design - MOSFET Biasing - Biasing FET Switching Circuits.

UNIT- IV IC AMPLIFIERS 9

Biasing of IC Amplifiers, Current Mirror and Current Steering Circuits, Current Sources, Differential Amplifier with resistive and Active loads- BiCMOS circuits.

UNIT- V POWER SUPPLIES 9

Linear mode power supply - Rectifiers - Filters - Half-Wave Rectifier Power Supply - Full-WaveRectifier Power Supply - Voltage regulators: Voltage regulation - Linear series, shunt and switching Voltage Regulators - Over voltage protection - BJT and MOSFET – Switched mode power supply (SMPS) - Design of Regulated DC Power Supply.

TOTAL PERIODS : 45

COURSE OUTCOMES:

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

1. Explain the V-I characteristic of diode, UJT and SCR
2. Describe the equivalence circuits of transistors
3. Operate the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices.
4. Design and understand different biasing circuits, amplifiers and power supplies.

TEXT BOOKS:

1. Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, ―Electronic Devices and circuits‖, Third Edition, Tata McGraw- Hill, 2008.

2. Donald A Neaman, ―Semiconductor Physics and Devices‖, Fourth Edition, Tata McGrawHill Inc. 2012.

REFERENCES:

1. Robert Boylestad and Louis Nashelsky, ―Electron Devices and Circuit Theory‖ Pearson Prentice Hall, 10th edition, July 2008.
2. R.S.Sedha, ― A Text Book of Applied Electronics‖ S.Chand Publications, 2006.
3. Yang, ―Fundamentals of Semiconductor devices‖, McGraw Hill International Edition, 1978

EC1302 **SIGNALS AND SYSTEMS** **L T P C**

3 1 0 4

OBJECTIVES:

- To understand the basic properties of signal & systems
- To know the methods of characterization of LTI systems in time domain
- To analyze continuous time signals and system in the Fourier and Laplace domain
- To analyze discrete time signals and system in the Fourier and Z transform domain

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS **12**

Requirements of signal and system analysis in communication, Introduction to continuous and discrete time signals, Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids, Basic operation on the signals -Problems on signal operations, 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.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS **12**

Fourier series for periodic signals - Fourier Transform – properties- spectral analysis of CT signals- Laplace Transforms-properties- convergence of Laplace Transform

UNIT III LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS **12**

System modeling of CT system-LTI system-Impulse response - Differential Equation- Analysis of CT system using Fourier and Laplace transforms - convolution integrals-CT system connected in series / parallel.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS **12**

Baseband signal sampling(only definition) – Fourier Transform of discrete time signals (DTFT) – Properties of DTFT- spectral analysis of DT signals- Z-Transform- ROC and its properties- Properties of Z- Transform.

UNIT V LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS **12**

System modeling of DT system-Impulse response – Difference equations-Analysis of DT system using Discrete Time Fourier Transform and Z Transform -Convolution sum- DT system connected in series and parallel.

TOTAL PERIODS : 60

COURSE OUTCOMES:

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

1. To be able to determine if a given system is linear/causal/stable
2. Capable of determining the frequency components present in a deterministic signal
3. Capable of characterizing LTI systems in the time domain and frequency domain
4. To be able to compute the output of an LTI system in the time and frequency domains

TEXT BOOKS:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, ―Signals and Systems‖, Pearson, 2015.(Unit 1-V)

REFERENCES:

1. B. P. Lathi, ―Principles of Linear Systems and Signals‖, Second Edition, Oxford, 2009.
2. R.E.Zeimer, W.H.Tranter and R.D.Fannin, ―Signals & Systems - Continuous and Discrete‖, Pearson, 2007.
3. John Alan Stuller, ―An Introduction to Signals and Systems‖, Thomson, 2007.

EC1303 DIGITAL SYSTEM DESIGN L T P C

3 0 0 3

OBJECTIVES:

- To present the Digital fundamentals, Boolean algebra and its applications in digital systems
- To familiarize with the design of various combinational digital circuits using logic gates
- To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits
- To explain the various semiconductor memories and related technology
- To introduce the electronic circuits involved in the making of logic gates

UNIT I DIGITAL FUNDAMENTALS 9

Number systems-decimal ,Binary ,Octal,Hexadecimal ,1's and 2's complements,Codes-Binary,BCD,Excess 3,Gray,Boolean theorems,Logic Gates,Universal gates,Sum of products and product of sums,Minterm and Maxterms, Karnaugh map minimization and Quine –Mc-Cluskey method of minimization.

UNIT II COMBINATIONAL CIRCUIT DESIGN 9

Design of Half adder and Full adder, Half and Subtractor, Binary Parallel adder-Carry look ahead adder, BCD adder, Multiplexer, Demultiplexer, Magnitude comparator, Decoder, Encoder, Priority Encoder, Code converter, Parity generator &Parity checker**.**

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Flip Flops-SR,JK ,T,D,Master/Slave FF-operation and excitation tables,Triggering of FF,Analysis and design of clocked sequential circuits-Moore/Mealy models,State minimization,State assignment,circuit implementation-Design of counters-Ripple counters,Ring Counters,Shift register,Universal shift register

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Stable and Unstable states, output specifications, Cycles and Races, Race free assignments, State reduction, Fundamental and Pulse mode sequential circuits, Hazards, Design of Hazard free circuits

UNIT V MEMORY DEVICES AND DIGITAL INTEGRATED CIRCUITS 9

Basic memory Structure-ROM-PROM-EPROM-EEPROM-EAPROM,RAM –Static and Dynamic RAM-Programmable Logic devices-Programmable Logic Array(PLA)-Programmable Array Logic(PAL)-Field Programmable Gated Arrays(FPGA)-Implementation of combinational logic circuits using ROM,PLA and PAL.

Digital Integrated circuits:Logiclevels,Propagation delay, Power dissipation, Fan–out and Fan-in ,noise margin, Logic families and their characteristics-TTL,CMOS

TOTAL PERIODS :45

TEXT BOOK

1. M.Moris Mano and Michal D.Ciletti,"Digital Design",6 thedition,Pearson 2017

REFERENCES:

1. CharlesH.Roth. "Fundamentals of Logic design",7thedition,Thomas learning,2019.
2. ThomasL.Floyd,"Digital fundamentals",11th edition ,Pearson education Inc,2017.
3. S.Salivahanan and S.Arivazhagan"DigitalElectronics",Ist edition ,VikasPublishinf House pvt Ltd,2012.
4. AnilK.Maini "Digital Electronics", Wiley ,2014.
5. A.Anand Kumar"Fundamentals of Digital circuits",4the edition ,PHI learning Private Limited,2016.
6. Soumitra Kumar Mandal"Digital Electronics",McGraw Hill Education Private Limited,2016

EC 1304 CONTROL SYSTEMS L T P C

3 0 0 3

OBJECTIVES:

1. To introduce the components and their representation of control systems
2. To learn various methods for analyzing the time response, frequency response and Stability of the systems.
3. To learn the various approach for the state variable analysis.

UNIT I SYSTEMS COMPONENTS AND THEIR REPRESENTATION 9

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory Electrical and Mechanical Transfer Function Models-Block diagram Models-Signal flow graphs models-DC and AC servo Systems-Synchronous –Hydraulic & Pneumatic Systems

UNIT II TIME RESPONSE ANALYSIS 9

Transient response-steady state response-Measures of performance of the standard first order and second order system-effect on an additional zero and an additional pole-steady error constant and system- type number-PID control-Analytical design for PD, PI,PID control systems

UNIT III FREQUENCY RESPONSE AND SYSTEM ANALYSIS 9

Closed loop frequency response-Performance specification in frequency domain-Frequency response of standard second order system- Bode Plot - Polar Plot- Design of compensators using Bode plots-Cascade lead compensation-Cascade lag compensation-Cascade lag-lead compensation

UNIT IV CONCEPTS OF STABILITY ANALYSIS 9

Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus-Nyquist stability criterion&Nyquist Plot.

UNIT V CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS 9

State variable representation-Conversion of state variable models to transfer functions- conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems-Equivalence between transfer function and state variable representations-State variable analysis of digital control system-Digital control design using state feedback.

TOTAL PERIODS: 45

COURSE OUTCOMES:

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

1. Ability to understand the use of transfer function models for analysis physical systems and introduce the control system components.
2. Perform time domain analysis and steady state error analysis of control systems required for stability analysis.
3. Perform the open loop and closed–loop frequency response analysis of control systems required for stability analysis.
4. Design the compensation technique that can be used to stabilize control systems.
5. Able to understand the state variable representation of physical systems.
6. Able to design the servomotors, potentiometers, controllers, compensators and tacho generators.

TEXT BOOK:

1. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 4th Edition, 2012.

REFERENCES:

1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5 th Edition, 2007.
2. K. Ogata, „Modern Control Engineering", 5th edition, PHI, 2012.
3. S.K.Bhattacharya, Control System Engineering, 3rd Edition, Pearson, 2013.
4. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition,1995.

CS1303 OBJECT ORIENTED PROGRAMMING LABORATORY

L T P C
0 0 4 2

OBJECTIVES

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.
- To develop applications using generic programming and event handling.

LIST OF EXPERIMENTS

1. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection(i.e domestic or commercial). Compute the bill amount using the following tariff.

   If the type of the EB connection is domestic, calculate the amount to be paid as follows:

   - First 100 units - Rs. 1 per unit
   - 101-200 units - Rs. 2.50 per unit
   - 201 -500 units - Rs. 4 per unit
   - > 501 units - Rs. 6 per unit

   If the type of the EB connection is commercial, calculate the amount to be paid as follows:

   - First 100 units - Rs. 2 per unit
   - 101-200 units - Rs. 4.50 per unit
   - 201 -500 units - Rs. 6 per unit
   - > 501 units - Rs. 7 per unit

2. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.
3. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
4. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.
5. Write a program to perform string operations using Array List. Write functions for the following

   a. Append - add at end

b. Insert – add at particular index

c. Search

d. List all string starts with given letter.

6 . Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

7. Write a Java program to implement user defined exception handling.

8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

9. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

10. Write a java program to find the maximum value from the given type of elements using a generic function.

11. Design a calculator using event-driven programming paradigm of Java with the following options.

a) Decimal manipulations

b) Scientific manipulations

12. Develop a simple student database management system using event-driven and concurrent programming paradigms of Java. Use JDBC to connect a back-end database.

TOTAL PERIODS : 60

COURSE OUTCOMES:

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

1. Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.
2. Develop and implement Java Programs with Array list.
3. Develop and implement Java programs with exception handling and multithreading.
4. Design applications using file processing, generic programming and event handling.
5. Ability to solve real world problems using features of Object Oriented Programming
6. Ability to write, debug and document well-structured Java Applications

EC1305 ANALOG AND DIGITAL CIRCUITS LABORATORY L T P C

0 0 3 2

OBJECTIVES:

- Study the characteristic of CE,CB and CC Amplifier
- Learn the frequency response of CS Amplifiers
- Study the Transfer characteristic of differential amplifier
- Perform experiment to obtain the bandwidth of single stage and multistage amplifiers
- Perform SPICE simulation of **E**lectronic **C**ircuits

LIST OF ANALOG EXPERIMENTS:

1. Half Wave and Full Wave Rectifiers, Filters, Power supplies

2. Frequency Response of CE, CB, CC and CS amplifiers

3. Darlington Amplifier

4. Differential Amplifiers- Transfer characteristic, CMRR Measurement

5. Cascode / Cascade amplifier

6. Class A and Class B Power Amplifiers

7. Determination of bandwidth of single stage and multistage amplifiers

8. Spice Simulation of Common Emitter and Common Source amplifiers

LIST OF DIGITAL EXPERIMENTS

9. Design and implementation of code converters using logic gates

(i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa

10. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483

11. Design and implementation of Multiplexer and De-multiplexer using logic gates

12. Design and implementation of encoder and decoder using logic gates

13. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters

14. Design and implementation of 3-bit synchronous up/down counter

15. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.

16. Realize the Ring Counter and Johnson Counter usingIC7476.

17. Design and verify the Truth Table of 3-bit Parity Generator and 4-bit Parity Checker using basic logic gates with an even parity bit.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Differentiate cascade and cascade amplifier.
- Analyze the limitation in bandwidth of single stage and multi stage amplifier
- Simulate amplifiers using Spice
- Measure CMRR in differential amplifier

HS1301 INTERPERSONAL SKILLS LABORATORY L T P C

0 0 2 1

OBJECTIVES:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- Improve general and academic listening skills.
- Make effective presentation.

UNIT I

Listening as a key skill- its importance- Speaking- give personal information- ask for personal information- Improving pronunciation- pronunciation basics- Taking lecture notes- preparing to listen to a lecture- articulate a complete idea.

UNIT II

Interpersonal skills- nurturing- empathetic- self-control- patient- sociability- warmth- social skills-Team Work-Work Ethic- willing to work- initiative- self-motivated - Integrity.

UNIT III

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

UNIT IV

Being an active listener: giving verbal and non-verbal feedback- participating in a group discussion- asking and getting clarifications- Summarizing academic readings and lectures- Conversational speech- listening to and participating in conversations- persuade.

UNIT V

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

TOTAL PERIODS : 30

COURSE OUTCOMES:

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

1. Listen and respond appropriately.
2. Participate in group discussions
3. Make effective presentations
4. Participate confidently and appropriately in conversations both formal and informal

TEXT BOOKS:

1. Brooks,Margret. Skills forSuccess. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.
2. Richards,C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES:

1. Bhatnagar, Nitin and MamtaBhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014
4. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
5. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.

MA1401 PROBABILITY AND RANDOM PROCESSES L T P C

4 0 0 4

OBJECTIVES:

- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in IT fields.
- To understand the concept of correlation and spectral densities.
- To understand the significance of linear systems with random inputs.

UNIT-I PROBABILITY ANDRANDOMVARIABLES 12

Probability – Axioms of probability – Conditional probability – Total probability -Baye‘s theorem - Discrete and continuous random variables –Probability mass function-Probability density function-properties-Mathematical Expectations-conditional expectations- Moments – Moment generating functions – characteristic function-Chebyshev’s inequality

UNIT-II STANDARD DISTRIBUTION 12

Discrete distribution-Bernauoli’s trial-Binomial distribution- Poisson distribution- Geometric distribution-Negative Binomial Distribution- continuous distribution-Uniform distribution, Exponential distribution–Gamma distribution–Weibull distribution-Normal distributions.

UNIT-III TWO - DIMENSIONALRANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT-IV CLASSIFICATION RANDOMPROCESSES 12

Definition and Examples-First order and second order stationaryprocess-srictly sense and wide sense stationary random process-Ergodic process- Markov process - Markov chain - Poisson process – Binomial and normal process- Random telegraph process.

UNIT-V CORRELATION ANDSPECTRAL DENSITIES 12

Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectral density – Properties. Linear time invariant system – System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

1. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
2. Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
3. Apply the concept random processes in engineering disciplines.
4. Understand and apply the concept of correlation and spectral densities.
5. The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable. Able to analyze the response of random inputs to linear time in variant systems.

TEXT BOOKS:

1. Ibe, O.C.," Fundamentals of Applied Probability and Random Processes ", 1st Indian Reprint, Elsevier,2007.
2. Peebles, P.Z., "Probability, Random Variables and Random Signal Principles ", Tata McGraw Hill, 4th Edition, New Delhi,2002.

REFERENCES:

1. Cooper. G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", Oxford University Press, New Delhi, 3rd Indian Edition,2012.
2. Hwei Hsu, "Schaum‘s Outline of Theory and Problems of Probability, Random Variables and Random Processes ", Tata McGraw Hill Edition, New Delhi,2004.
3. Miller.S.L.andChilders.D.G.,-ProbabilityandRandomProcesseswithApplicationstoSignal Processing and Communications ", Academic Press,2004.
4. Stark. H. andWoods. J.W., -Probabilityand Random Processes with Applications to Signal Processing ", Pearson Education, Asia, 3rd Edition,2002.
5. Yates.R.D.andGoodman.D.J.,-ProbabilityandStochasticProcesses",WileyIndiaPvt.Ltd., Bangalore, 2nd Edition, 2012.

EC1401 ELECTRONIC CIRCUITS DESIGN L T P C

3 0 0 3

OBJECTIVES:

- To give a comprehensive exposure to all types of amplifiers and oscillators constructed with discrete components. This helps to develop a strong basis for building linear and digital integrated circuits
- To study about feedback amplifiers and oscillators principles
- To design oscillators.
- To study about tuned amplifier.
- To design multivibrators & Schmitt Trigger
- To design large signal power amplifiers

UNIT I FEEDBACK AMPLIFIERS AND STABILITY 9

Feedback Concepts – Properties of negative feedback – Four Feedback Topologies – analysis of series- series, shunt-shunt and shunt-series feedback amplifiers — Stability Problem – Gain and Phase-margins- Frequency compensation.

UNIT II OSCILLATORS 9

Barkhausen criterion for oscillation –phase shift, Wien bridge -Hartley & Colpitt‘s oscillators –Clapp oscillator-Ring oscillators and crystal oscillators –oscillator amplitude stabilization ,Negative resistance Oscillator-UJT Oscillator

UNIT III TUNED AMPLIFIERS 9

Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers –Types of tuned amplifier -effect of cascading single tuned and double tuned amplifiers on bandwidth –- Stability of tuned amplifiers –Neutralization -Hazeltine neutralization method.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS 9

Pulse circuits-RC integrator and differentiator circuits –diode clampers and clippers ,Multivibrators -Collector coupled and Emitter coupled Astable multivibrator – Monostable multivibrator - Bistable multivibrators - Triggering methods for Bistable multivibrators Schmitt Trigger.

UNIT V POWER AMPLIFIERS 9

Classification of large signal amplifiers, Class A, B, AB, D, Conversion efficiency, Class C tuned amplifier.

TOTAL PERIODS :45

COURSE OUTCOMES:

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

1. Analyze different types of amplifier, oscillator and multivibrator circuits
2. Design BJT amplifier and oscillator circuits
3. Analyze transistorized amplifier and oscillator circuits
4. Design and analyze feedback amplifiers
5. Design OF FM Circuits.

TEXT BOOKS:

1. Sedra and Smith, ―Micro Electronic Circuits‖; Sixth Edition, Oxford University Press, 2011.(UNIT I, III,IV,V)
2. JacobMillman, ―Microelectronics‘, McGraw Hill, 2nd Edition, Reprinted, 2009.(UNIT I,II,IV,V)

REFERENCES:

1. Robert L. Boylestad and Louis Nasheresky, ―Electronic Devices and Circuit Theory‖, 10th Edition, Pearson Education / PHI, 2008
2. David A. Bell, ―Electronic Devices and Circuits‖, Fifth Edition, Oxford University Press, 2008.
3. Millman J. and Taub H., ―Pulse Digital and Switching Waveforms‖, TMH, 2000
4. Millman and Halkias. C., Integrated Electronics, TMH, 2007.

EC1402 **ELECTROMAGNETIC FIELDS** **L T P C**

4 1 0 4

OBJECTIVES :

- To analyze fields a potentials due to static changes
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

UNIT I **INTRODUCTION** **9**

Introduction to Co-ordinate System – Rectangular – Cylindrical and Spherical Co-ordinate System – Introduction to line, Surface and Volume Integrals – Definition of Curl, Divergence and Gradient – Meaning of Stokes theorem and Divergence theorem. Helmholtz'stheorem

Coulomb's Law in Vector Form – Definition of Electric Field Intensity – Principle of Superposition – Electric Field due to discrete charges – Electric field due to continuous charge distribution - Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field due to an infinite uniformly charged sheet.

UNIT II **STATIC ELECTRIC FIELDS** **9**

Electric Scalar Potential – Relationship between potential and electric field - Potential due to infinite uniformly charged line – Potential due to electrical dipole - Electric Flux Density – Gauss Law – Proof of Gauss Law – Applications. Poisson's and Laplace's equation – Electric Polarization-Nature of dielectric materials- Definition of Capacitance – Capacitance of various geometries using Laplace's equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law – continuity equation for current.

UNIT III **STATIC MAGNETIC FIELDS** **9**

The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications.

Magnetic flux density –The Lorentz force equation for a moving charge and applications – Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I.

UNIT IV **STATIC MAGNETIC FIELDS IN MATERIALS** **9**

Magnetic moment – Magnetic Vector Potential.Definition of Inductance – Inductance of loops and solenoids – Definition of mutual inductance – simple examples.Energy density in magnetic fields – Nature of magnetic materials – magnetization and permeability - magnetic boundary conditions.Applications of Magnetic Fields.

UNIT V TIME VARYING FIELDS AND MAXWELL'S EQUATIONS 9

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields. Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

Derivation of Wave Equation – Uniform Plane Waves –Wave equation in Phasor form – Plane waves in free space and in a homogenous material. Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect.

COURSE OUTCOMES:

By the end of this course, the student should be able to:

1. Display an understanding of fundamental electromagnetic laws and concepts
2. Write Maxwell's equations in integral, differential and phasor forms and explain their physical meaning
3. Explain electromagnetic wave propagation in lossy and in losslessmedia
4. Solve simple problems requiring estimation of electric and magnetic field quantities based on these concepts andlaws.

TEXTBOOKS

1. W H.Hayt& J A Buck : "Engineering Electromagnetics" TATA McGraw-Hill, 7th Edition 2007 (Unit I,II,III).
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Pearson Education/PHI 4nd edition 2006. (Unit IV, V).

REFERENCES

1. 1.MatthewN.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, 4th edition, 2007
2. 2.NarayanaRao, N : "Elements of Engineering Electromagnetics" 6th edition, Pearson Education, New Delhi, 2006.
3. 3.Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons ,3rd edition 2003.
4. 4.DavidK.Cheng: "Field and Wave Electromagnetics - Second Edition-Pearson Edition, 2004.
5. 5. G.S.N. Raju, Electromagnetic Field Theory & Transmission Lines, Pearson Education, 2006

EC1403 LINEAR INTEGRATED CIRCUITS L T P C

3 0 0 3

OBJECTIVES:

- 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 analog multipliers and PLL
- To learn the theory of ADC and DAC
- To introduce the concepts of waveform generation and introduce some special function ICs

UNIT I BASICS OF OPERATIONAL AMPLIFIERS 9

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier – General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations .

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analog Multiplier using Emitter Coupled Transistor Pair – Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing and clock synchronisation.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS 9

Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2 Ladder type, Voltage Mode and Current-Mode R – 2R Ladder types – switches for D/A converters high speed sample-and-hold circuits, A/D Converters – specifications – Flash type – Successive Approximation type – Single Slope type – Dual Slope type – A/D Converter using Voltage-to-Time Conversion – Over-sampling A/D Converters, Sigma – Delta converters.

UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS 9

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator,ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators – IC 723 general purpose regulator – Monolithic switchin g regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto couplers and fibre optic IC.

TOTAL PERIODS : 45

COURSE OUTCOMES:

1. Upon completion of the course, the student should be able to:
2. Design linear and non linear applications of OP – AMPS AND FABRICATION PROCESS
3. Design applications using analog multiplier and PLL
4. Design ADC and DAC using OP – AMPS
5. Generate waveforms using OP – AMP Circuits
6. Analyze special function ICs

TEXT BOOKS:

1. D.RoyChoudhry, Shail Jain, ―Linear Integrated Circuits‖, New Age International Pvt. Ltd., 2018, Fifth Edition. (Unit I – V)

REFERENCES:

1. Ramakant A. Gayakwad, ―OP-AMP and Linear ICs‖, 4th Edition, Prentice Hall / Pearson Education, 2015.
2. Gray and Meyer, ―Analysis and Design of Analog Integrated Circuits‖, Wiley International,5th Edition, 2009.
3. S.Salivahanan& V.S. KanchanaBhaskaran, ―Linear Integrated Circuits‖, TMH,2nd Edition, 4 th Reprint, 2016.

CS1401 DATA STRUCTURES AND ALGORITHMS L T P C

4 0 0 3

OBJECTIVES:

- Acquire basic knowledge of linear and non-linear data structures.
- Design and implement arrays, stacks, queues.
- Understand the complex data structures such as trees and graphs.
- Understand the various techniques of sorting and searching.
- Design and implement various programming paradigms and its complexity.

UNIT I ALGORITHM ANALYSIS 9

Mathematical background - Run time calculations - Logarithms in running time – List ADT- Linked lists– Doubly Linked Lists- Circularly Linked Lists – Operations-Applications.

UNIT II STACK ADT AND QUEUE ADT 9

Stack model-Implementation of Stacks– Applications – Queue model-Implementation of Queue– Applications of Queues.

UNIT III TREES 9

Binary trees – Tree Traversal with an application- Implementation-Expression trees - The Search Tree ADT-Binary Search Trees-AVL trees-Single Rotation-Double Rotation- B trees.

UNIT IV SORTING AND SEARCHING 9

Sorting – Insertion sort- Quick sort - Selection sort- Merge sorts - Radix sorts-Searching - Basic search techniques - Sequential searching - Binary search –Hashing- Hash Functions- Separate Chaining-Open Addressing - Rehashing.

UNIT V GRAPHS ALGORITHMS 9

Definitions- Representation of Graphs- Graph Traversal-Topological Sort - Shortest path algorithm-Dijkstra's algorithm - Minimum spanning tree -Prim's and Kruskal's algorithms-Applications of Depth-First search.

TOTAL PERIODS: 45

COURSE OUTCOMES:

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

CO1: comprehend the basics in algorithms and data structures.

CO2: apply the knowledge of linear data structures to Engineering problems.

CO3: Gain the knowledge about Tree ADT and its Applications.

CO4: Technical knowhow on the implementation of sorting searching algorithms

CO5: Implement graphs in real world scenarios

TEXT BOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, PearsonEducation,1997.
2. Reema Thareja, “Data Structures Using C”, Second Edition , Oxford University Press,2011

REFERENCES:

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

HV1401 UNIVERSAL HUMAN VALUES L T P C
(Common to all B.E / B.TECH Branches) 2 1 0 3

Universal Human Values: Understanding Harmony

OBJECTIVE:

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

COURSE TOPICS:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

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

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

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

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

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

Module 3: Understanding Harmony in the Family and Society- Harmony in Human Human Relationship

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

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

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all pervasive space
21. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in Nature (film "Home" can be used), pollution, depletion of resources and role of Technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up.

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

READINGS:

TEXT BOOK :

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

REFERENCE BOOKS :

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)13. Gandhi - Romain Rolland (English)

EC1404 CIRCUITS DESIGN AND SIMULATION LABORATORY **L T P C**
0 0 4 2

OBJECTIVES:

- To gain hands on experience in designing electronic circuits
- To learn simulation software used in circuit design
- To learn the fundamental principles of amplifier circuits
- To differentiate feedback amplifiers and oscillators.
- To differentiate the operation of various multivibrators

DESIGN AND ANALYSIS OF THE FOLLOWING CIRCUITS

1. Series and Shunt feedback amplifiers-Frequency response, Input and output impedance
2. RC Phase shift oscillator and Wien Bridge Oscillator
3. Hartley Oscillator and Colpitts Oscillator
4. Single Tuned Amplifier
5. RC Integrator and Differentiator circuits
6. Astable and Monostablemultivibrators
7. Clippers and Clampers

SIMULATION USING SPICE (Using Transistor):

1. Ring Oscillator
2.Wein Bridge Oscillator
3. Double and Stagger tuned Amplifiers
4. BistableMultivibrator
5. Schmitt Trigger circuit with Predictable hysteresis
6. Analysis of power amplifier

TOTAL PERIODS: 60

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

- Analyze various types of feedback amplifiers
- Design oscillators, tuned amplifiers, wave-shaping circuits and multivibrators
- Design and simulate feedback amplifiers, oscillators, tuned amplifiers, wave-shaping circuits and multivibrators using SPICE Tool.

EC1405 LINEAR INTEGRATED CIRCUITS LABORATORY L T P C

0 0 4 2

OBJECTIVES:

- To understand the basics of linear integrated circuits and available ICs
- To understand the characteristics of the operational amplifier.
- 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

LIST OF EXPERIMENTS: DESIGN AND TESTING OF THE FOLLOWING CIRCUITS

1. Inverting, Non inverting and differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier
4. Active low-pass, High-pass and band-pass filters.
5. Astable & Monostablemultivibrators using op-amp.
6. Schmitt Trigger using op-amp.
7. Phase shift and Wien bridge oscillators using op-amp.
8. Astable and monostable multivibrators using NE555 Timer.
9. PLL characteristics and its use as Frequency Multiplier, Clock synchronization
10. R-2R Ladder Type D- A Converter using Op-amp.
11. DC power supply using LM317 and LM723.

SIMULATION USING SPICE

1. Active low-pass, High-pass and band-pass filters using Op-amp
2. Astable and Monostablemultivibrators using NE555 Timer.
3. A/ D converter
4 . Analog multiplier

TOTAL PERIODS: 60

COURSE OUTCOMES:

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

1. Design amplifiers, oscillators, D-A converters using operational amplifiers.
2. Design filters using op-amp and performs an experiment on frequency response.
3. Analyze the working of PLL and describe its application as a frequency multiplier.
4. Design DC power supply using ICs.
5. Analyze the performance of filters, multivibrators, A/D converter and analog multiplier using SPICE.

EC1406 TECHNICAL SEMINAR/MINI PROJECT

L T P C

0 0 2 2

Mini Project : System design with PCB Prototyping

Technical Content Delivery

Paper Presentation

Review of recent trends in Multi-disciplinary fields

EC1501 COMMUNICATION SYSTEMS L T P C

3 1 0 4

OBJECTIVES:

- To introduce the concepts of various analog modulation schemes.
- To understand the Noise performance of Receivers.
- To understand the principles Audio transducers.
- To know the principles of sampling & quantization.
- To understand the various Digital Modulation schemes.
- To learn the various baseband transmission schemes & fundamentals of channel coding.

UNIT I AMPLITUDE MODULATION 9

Amplitude Modulation- DSBSC, DSBFC, SSB, VSB - Modulation index, Spectra, Power relations and Bandwidth – AM Generation – Square law and Switching modulator, DSBSC Generation – Balanced and Ring Modulator, SSB Generation – Filter, Phase Shift and Third Methods, VSB Generation – Filter Method,–comparison of different AM techniques, Super heterodyne Receiver, Noise performance of AM receiver using envelope detection.

UNIT II ANGLE MODULATION 9

Phase and frequency modulation, Narrow Band and Wide band FM – Modulation index, Spectra, Power relations and Transmission Bandwidth - FM modulation –Direct and Indirect methods, FM Demodulation – FM to AM conversion, FM Discriminator - PLL as FM Demodulator. Pre- emphasis and de- emphasis for FM. FM receiver model. Noise performance of FM receiver.

UNIT III AUDIO ENGINEERING 9

Microphones-Introduction-Carbon Microphones-Crystal and Ceramic Microphones-Dynamic Microphones- Capacitor Microphones-Capacitor Radio-Frequency, Frequency-Modulated Microphones-wireless microphones –Loudspeakers-Introduction-Components- Electrodynamic Transducers-Diaphragm Types-Electrostatic transducers.

Sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform Quantization - quantization noise – PCM-Delta Modulation.

UNIT IV DIGITAL MODULATION SCHEME 9

Geometric Representation of signals – Types of Digital Modulation schemes, Generation, detection, PSD & BER of Coherent BPSK, QPSK - QAM – GMSK , M array schemes.

UNIT V BASEBAND TRANSMISSION & RECEPTION 9

Properties of Line codes- Line code presentation of Unipolar / Polar RZ & NRZ – Bipolar NRZ &RZ.– Manchester , Linear block codes –Hamming codes - Convolutional codes. ISI – Nyquist criterion for distortion less transmission – Pulse shaping – Correlative coding - Eye pattern – Receiving Filters-Matched Filter, Correlation receiver, Adaptive Equalization

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

1. Develop AM communication systems.
2. Describe the FM communication systems and analyze the noise performance.
3. Gain knowledge about Electroacoustic Devices and Understand sampling and quantization.
4. Understand the various Digital Modulation schemes.
5. Design and implement base band transmission schemes.

TEXT BOOK:

1. S. Haykin, ― Communication Systems, John Wiley, 2005 (Unit I –V)
2. Glen Ballou - Electroacoustic Devices: Microphones and Loudspeakers, Focal Press, Elsevier, 2009 (Unit-III)

REFERENCES:

1. B. Sklar, ―Digital Communication Fundamentals and Applications, 2nd Edition, Pearson Education, 2009
2. B.P.Lathi, ―Modern Digital and Analog Communication Systems‖ 3rd Edition, Oxford University Press 2007.
3. H P Hsu, Schaum Outline Series - ―Analog and Digital Communications‖, TMH 2006
4. J.G Proakis, ―Digital Communication‖, 4th Edition, Tata Mc Graw Hill Company, 2001.
5. Glen M. Ballou - Handbook for Sound Engineers, Fourth Edition, Focal Press, Elsevier, 2008

EC1502 DISCRETE-TIME SIGNAL PROCESSING L T P C
3 1 0 4

OBJECTIVES:

- To learn discrete Fourier transform, properties of DFT and its application to linear filtering
- To understand the characteristics of digital filters, design digital IIR and FIR filters and apply these filters to filter undesirable signals in various frequency bands
- To understand the effects of finite precision representation on digital filters
- To understand the fundamental concepts of multi rate signal processing and applications of digital signal processing

UNIT I DISCRETE FOURIER TRANSFORM 12

Review of signals and systems, Basic block diagram of a DSP System, Discrete Fourier transform (DFT) - DFT from DTFT, properties of DFT - periodicity, symmetry, circular convolution. Linear filtering - Filtering long data sequences - overlap save and overlap add method. Fast computation of DFT - Radix-2 Decimation-in-time (DIT) Fast Fourier transform (FFT), Decimation-in-frequency (DIF) Fast Fourier transform (FFT).

UNIT II INFINITE IMPULSE RESPONSE FILTERS 12

Characteristics of commonly used analog filters - Butterworth filters, Chebyshev filters. Design of IIR filters from analog filters (LPF, HPF, BPF, BRF) - Approximation of derivatives, Impulse invariance method, Bilinear transformation. Frequency transformation in the analog domain. Structure of IIR filter - direct form I, direct form II, Cascade, parallel realizations.

UNIT III FINITE IMPULSE RESPONSE FILTERS 12

Design of FIR filters - symmetric and Anti-symmetric FIR filters - design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method. FIR filter structures - linear phase structure, direct form realizations

UNIT IV FINITE WORD LENGTH EFFECTS 12

Fixed point and floating point number representation - ADC - quantization - truncation and rounding - quantization noise - input / output quantization - coefficient quantization error - product quantization error - overflow error - limit cycle oscillations due to product quantization and summation - scaling to prevent overflow.

UNIT V MULTIRATE SIGNAL PROCESSING AND APPLICATIONS 12

Sampling rate conversion – Interpolation, Decimation, Multistage implementation of Interpolation and Decimation -Applications of DSP- Voice processing: Analysis & Synthesis of Speech system, Sub-band coding, Musical Sound processing: Echo and Reverberation.

Total : 60 Periods

COURSE OUTCOMES:

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

1. Apply DFT for the analysis of digital signals and systems
2. Design IIR and FIR filters
3. Characterize the effects of finite precision representation on digital filters
4. Design multirate filters and Apply digital signal processing systems in various applications

TEXT BOOK:

John G. Proakis & Dimitris G.Manolakis, ―Digital Signal Processing – Principles, Algorithms & Applications‖, Fourth Edition, Pearson Education / Prentice Hall, 2007. (UNIT I – V)

REFERENCES:

S.Salivahanan, A.Vallavaraj & C.Gnanapriya, - Digital Signal Processing ,Tata McGraw-Hill Publication,2008
Sanjit K. Mitra, ―Digital Signal Processing – A Computer Based Approach‖, Tata Mc Graw Hill, 2007.

EC1503 MICROPROCESSOR AND MICROCONTROLLER L T P C
3 0 0 3

OBJECTIVES:

- To study the architecture of 8086 and 8051
- To study the addressing modes and instruction set of 8086 and 8051
- To introduce the need and use of interrupt structure in 8086 and 8051.
- To develop skill in simple program writing for 8086 and 8051 applications.
- To introduce commonly used peripheral / interfacing ICs.

UNIT I THE 8086 MICROPROCESSOR 9

Evolution of Microprocessors , Harvard and Von- Neumann architecture, RISC & CISC architectures, Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming –- Byte and String Manipulation.-Stacks - Interrupts and interrupt service routines – Modular programming using Macros and Procedures.

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure –Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming- Introduction to PIC Microcontroller.

UNIT V INTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.

COURSE OUTCOMES:

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

1. Understand and execute programs based on 8086 microprocessor.
2. Design Memory Interfacing circuits.
3. Design and interface I/O circuits.
4. Design and implement 8051 microcontroller based systems.

TEXT BOOKS:

1. Yu-Cheng Liu, Glenn A.Gibson, ―Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design‖, Second Edition, Prentice Hall of India, 2007. (UNIT I-III)
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, ―The 8051 Microcontroller and Embedded Systems: Using Assembly and C‖, Second Edition, Pearson education, 2011. (UNIT IV-V)

REFERENCES:

1. Doughlas V.Hall,―Microprocessors and Interfacing, Programming and Hardware‖,TMH,2012
2. A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, Tata McGrawHill, 2012

EC1504 WAVEGUIDES AND ANTENNA THEORY L T P C

3 1 0 4

OBJECTIVES:

- To introduce the various types of transmission lines and its characteristics.
- To impart technical knowledge in impedance matching.
- To enhance the student knowledge in the area of waveguide components.
- To enhance the student knowledge in the area of various antennas.
- To enable the student to understand the basic principles in antenna array.

UNIT-I TRANSMISSION LINE THEORY 9

General theory of Transmission lines - transmission line equation - general solution - distortion-less line-Campbell's equation-Input and transfer impedance - Open and short circuited lines-- reflection factor and reflection loss -Standing Waves, Nodes, Standing Wave Ratio.

UNIT-II IMPEDANCE MATCHING AND GUIDED WAVES 9

Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - TM and TE waves in rectangular waveguides.

UNIT-III WAVEGUIDE COMPONENTS 9

Introduction to S-Parameters-Properties- Directional Coupler- Power Divider- Waveguide Tees- attenuator- resonator – isolator- Circulator- Hybrid Ring.

UNIT IV RADIATION MECHANISMS AND DESIGN ASPECTS 9

Physical concept of radiation- Near- and far-field regions- Antenna Pattern Characteristics- Introduction to Antenna Parameters- Half wave dipole- Parabolic Reflector- Cassegrain Feed - Rectangular patch Microstrip antenna and Log periodic antenna.

UNIT V ANTENNA ARRAYS 9

Two-element array - N element linear array - Pattern multiplication- Broadside and End fire array - Binomial array- Smart antenna.

TEXTBOOKS:

1. John D Ryder, "Networks, lines and fields", 2nd Edition, Prentice Hall India, 2015.
2. Samuel Y. Liao,"Microwave Devices and Circuits" Prentice Hall,1990
3. John D Krauss, Ronald J Marhefka and Ahmad S. Khan, "Antennas and Wave Propagation: Fourth Edition, Tata McGraw-Hill, 2006.
4. Constantine A.Balanis, "Antenna Theory Analysis and Design", Third edition, John Wiley India Pvt Ltd., 2005

REFERENCES:

1. E.C.Jordan and K.G. Balmain, ―Electromagnetic Waves and Radiating Systems Prentice Hall of India, 2006.
2. Reinhold Ludwig and Powel Bretchko," RF Circuit Design – Theory and Applications", Pearson Education Asia, First Edition,2001.
3. David M. Pozar, "Microwave Engineering", Fourth Edition, Wiley India, 2012.
4. Annapurna Das, Sisir K. Das, "Microwave Engineering", Tata McGraw-Hill Education, 2000

EC1508 MEDICAL ELECTRONICS L T P C
3 0 0 3

OBJECTIVES:

- To gain knowledge about the various physiological parameters both electrical and non-electrical and the methods of recording and also the method of transmitting these parameters
- To study about the various assist devices used in the hospitals
- To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

Sources of bio medical signals, Bio-potentials, Biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, typical waveforms and signal characteristics

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

pH, PO2, PCO2, Colorimeter, Blood flow meter, Cardiac output,respiratory, blood pressure, temperature and pulse measurement, Blood Cell Counters.

UNIT ASSIST DEVICES 9

Cardiac pacemakers, DC Defibrillator, Dialyser, Ventilators, Magnetic Resonance Imaging Systems, Ultrasonic Imaging Systems.

UNIT IV PHYSICAL MEDICINE AND BIOTELEMETRY 9

Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy, Biotelemetry.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Telemedicine, Insulin Pumps, Radio pill, Endomicroscopy, Brain machine interface, Lab on a chip.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

1. Know the human body electro- physiological parameters and recording of bio-potentials
2. Comprehend the non-electrical physiological parameters and their measurement – body temperature, blood pressure, pulse, blood cell count, blood flow meter etc.
3. Interpret the various assist devices used in the hospitals viz. pacemakers, defibrillators, dialyzers and ventilators.
4. Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies , and bio-telemetry principles and methods.
5. Know about recent trends in medical instrumentation

TEXT BOOK:

1. Leslie Cromwell, ―Biomedical Instrumentation and Measurement‖, Prentice Hall of India, New Delhi, 2007. (UNIT I – V)

REFERENCES:

1. Khandpur, R.S., ―Handbook of Biomedical Instrumentation‖, TATA Mc Graw-Hill, New Delhi, 2003.
2. John G.Webster, ―Medical Instrumentation Application and Design‖, 3rd Edition, Wiley India 90 Edition, 2007
3. Joseph J.Carr and John M.Brown, ―Introduction to Biomedical Equipment Technology‖, John Wiley and Sons, New York, 2004.

EC1509 ADVANCED DIGITAL SYSTEM DESIGN L T P C
3 0 0 3

OBJECTIVES:

- To introduce methods to analyze and design synchronous and asynchronous sequential circuits.
- To introduce the architectures of programmable devices.
- To introduce design and implementation of digital circuits using programming tools.

UNIT I SEQUENTIAL CIRCUIT DESIGN 9

Analysis of clocked synchronous sequential circuits and modeling- State diagram, state table, state table assignment and reduction-Design of synchronous sequential circuits design of iterative circuits-ASM chart and realization using ASM

UNIT II ASYNCHRONOUS SEQUENTIAL CIRCUIT DESIGN 9

Analysis of asynchronous sequential circuit – flow table reduction-races-state assignment-transition table and problems in transition table- design of asynchronous sequential circuit-Static, dynamic and essential hazards – data synchronizers – mixed operating mode asynchronous circuits – designing vending machine controller

UNIT III FAULT DIAGNOSIS AND TESTABILITY ALGORITHMS 9

Fault table method-path sensitization method – Boolean difference method-D algorithm - Tolerance techniques – The compact algorithm – Fault in PLA – Test generation-DFT schemes – Built in self-test.

UNIT IV SYNCHRONOUS DESIGN USING PROGRAMMABLE DEVICES 9

Programming logic device families – Designing a synchronous sequential circuit using PLA/PAL – Realization of finite state machine using PLD – FPGA – Xilinx FPGA-Xilinx 4000

UNIT V SYSTEM DESIGN USING VERILOG 9

Hardware Modelling with Verilog HDL – Logic System, Data Types and Operators For Modelling in Verilog HDL - Behavioural Descriptions in Verilog HDL – HDL Based Synthesis – Synthesis of Finite State Machines– structural modeling – compilation and simulation of Verilog code –Test bench - Realization of combinational and sequential circuits using Verilog – Registers

– counters – sequential machine – serial adder – Multiplier- Divider – Design of simple microprocessor.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

- Analyze and design sequential digital circuit
- Identify the requirements and specifications of the system required for a given application
- Design and use programming tools for implementing digital circuits of industry standards

TEXT BOOKS:

1. Charles H.Roth Jr "Fundamentals of Logic Design" Thomson Learning 2004
2. M.D.Ciletti , Modeling, Synthesis and Rapid Prototyping with the Verilog HDL, Prentice Hall, 1999.

REFERENCES:

1. M.G.Arnold, Verilog Digital – Computer Design, Prentice Hall (PTR), 1999.
2. Nripendra N Biswas "Logic Design Theory" Prentice Hall of India,2001
3. Parag K.Lala "Digital system Design using PLD" B S Publications,2003
4. Parag K.Lala "Fault Tolerant and Fault Testable Hardware Design" B S Publications,2002
5. S.Palnitkar , Verilog HDL – A Guide to Digital Design and Synthesis, Pearson , 2003.

EC1510 COMPUTER ARCHITECTURE AND ORGANIZATION L T P C
3 0 0 3

OBJECTIVES:

- To make students understand the basic structure and operation of digital computer
- To familiarize with implementation of fixed point and floating-point arithmetic operations
- To study the design of data path unit and control unit for processor
- To understand the concept of various memories and interfacing
- To introduce the parallel processing technique

UNIT I COMPUTER ORGANIZATION & INSTRUCTIONS 9

Basics of a computer system: Evolution, Ideas, Technology, Performance, Power wall, Uniprocessors to Multiprocessors. Addressing and addressing modes. Instructions: Operations and Operands, Representing instructions, Logical operations, control operations.

UNIT II ARITHMETIC 9

Fixed point Addition, Subtraction, Multiplication and Division. Floating Point arithmetic, High performance arithmetic, Sub word parallelism

UNIT III THE PROCESSOR 9

Introduction, Logic Design Conventions, Building a Data path - A Simple Implementation scheme - An Overview of Pipelining - Pipelined Data path and Control. Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions.

UNIT IV MEMORY AND I/O ORGANIZATION 9

Memory hierarchy, Memory Chip Organization, Cache memory, Virtual memory, Bus Architectures, Communication Methodologies, Mass storage Devices.

UNIT V ADVANCED COMPUTER ARCHITECTURE 9

Parallel processing architectures and challenges, Hardware multithreading, Multicore and shared memory multiprocessors, Introduction to Graphics Processing Units, Clusters and Warehouse scale computers

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

1. Describe data representation, instruction formats and the operation of a digital computer
2. Illustrate the fixed point and floating-point arithmetic for ALU operation
3. Discuss about implementation schemes of control unit and pipeline performance
4. Explain the concept of various memories, interfacing and organization of multiple processors
5. Discuss parallel processing technique and unconventional architectures

TEXT BOOKS:

1. David A. Patterson and John L. Hennessey, ―Computer Organization and Design‖, Fifth edition, Morgan Kauffman / Elsevier, 2014. (UNIT I-V)

2. Miles J. Murdocca and Vincent P. Heuring, ―Computer Architecture and Organization: An Integrated approach‖, Second edition, Wiley India Pvt Ltd, 2015 (UNIT IV,V)

REFERENCES

1. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, ―Computer Organization―, Fifth edition, Mc Graw-Hill Education India Pvt Ltd, 2014.

2. William Stallings ―Computer Organization and Architecture‖, Seventh Edition, Pearson Education, 2006.

EC1511 PRODUCT DESIGN AND DEVELOPMENT L T P C
3 0 0 3

OBJECTIVES:

- Understand the Product Development Process
- Learning By Doing
- Apply tools learned in class
- Apply and share existing knowledge
- Improve team work and communication skills
- Improve project management skills

UNIT I INTRODUCTION 9

Need for IPPD – Strategic importance of Product development – integration of customer, designer, material supplier and process planner, Competitor and customer – Behaviour analysis. Understanding customer – prompting customer understanding – involve customer in development and managing requirements – Organization – process management and improvement – Plan and establish product specifications.

UNIT II CONCEPT GENERATION AND SELECTION 9

Task – Structured approaches – clarification – search – externally and internally – explore systematically – reflect on the solutions and processes – concept selection – methodology –benefits.

UNIT III PRODUCT ARCHITECTURE 9

Implications – Product change – variety – component standardization – product performance– manufacturability – product development management – establishing the architecture –creation – clustering – geometric layout development – fundamental and incidental interactions – related system level design issues – secondary systems – architecture of the chunks – creating detailed interface specifications.

UNIT IV INDUSTRIAL DESIGN 9

Integrate process design – Managing costs – Robust design – Integrating CAE, CAD, CAM tools – Simulating product performance and manufacturing processes electronically – Need for industrial design – impact – design process – investigation of for industrial design –impact – design process – investigation of customer needs – conceptualization – refinement –management of the industrial design process – technology driven products – user – driven products – assessing the quality of industrial design

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UNIT V DESIGN FOR MANUFACTURING AND PRODUCT DEVELOPMENT 9

Definition – Estimation of Manufacturing cost – reducing the component costs and assemblycosts – Minimize system complexity – Prototype basics – principles of prototyping –planning for prototypes – Economic Analysis – Understanding and representing tasks –baseline project planning – accelerating the project – project execution.

TOTAL: 45 PERIODS

COURSE OUTCOME:

The student will be able to design some products for the given set of applications; also the knowledge gained through prototyping technology will help the student to make a prototype of a problem and hence product design and development can be achieved.

TEXT BOOK:

1. Kari T.Ulrich and Steven D.Eppinger, ”Product Design and Development”, McGraw-Hill International Edns. 1999.

REFERENCES:

1. Kemnneth Crow, “Concurrent Engg./Integrated Product Development”, DRM Associates, 26/3,Via Olivera, Palos Verdes, CA 90274(310) 377-569, Workshop Book.

2. Stephen Rosenthal, “Effective Product Design and Development”, Business One Orwin, Homewood, 1992, ISBN 1-55623-603-4.

3. Staurt Pugh, “Tool Design –Integrated Methods for Successful Product Engineering”, Addison Wesley Publishing, New york, NY.tion.

EC1512 **MIXED SIGNAL IC DESIGN** **L-T-P-C**

3-0-0-3

OBJECTIVE:

- This course is to provide students with sound understanding of metal-oxide semiconductor field-effect transistor and the relationship of process technology with models used for analog IC.
- CMOS digital circuits will be introduced and analyzed.
- It provides exposure to the complex, non-digital behavior of the devices and circuits with which digital systems are implemented.
- Emphasis is given on the circuit design, optimization, and layouts. Course Content

UNIT I **9**

Building blocks for CMOS amplifiers: design of current mirrors, differential amplifiers, CMOS operational trans conductance amplifiers: design of single ended telescopic cascode, folded cascode and two-stage amplifiers.

UNIT II **9**

Frequency compensation schemes: Miller compensation, Ahuja compensation and Nested Miller compensation.

UNIT III **9**

Design of fully differential amplifiers, discussion of common mode feedback circuits. Switched capacitor circuits, design of switched capacitor amplifiers and integrators, effect of opamp finite gain, bandwidth and offset, circuit techniques for reducing effects of opamp imperfections, switches and charge injection and clock feed-through effects.

UNIT IV **9**

Design of sample and hold and comparators. Fundamentals of data converters; Nyquist rate A/D converters (Flash, interpolating, folding flash, SAR and pipelined architectures); Nyquist rate D/A converters - voltage, current and charge mode converters, hybrid and segmented converters); Oversampled A/D and D/A converters.

UNIT V **9**

Design of PLL's and DLL's and frequency synthesizers.

Total:45 Periods

COURSE OUTCOME:

Able to Analyze and design op-amps, comparators, sample and hold circuits, switched capacitor circuits, non-linear analog circuits and data converters. Able to Design multi-stage MOS amplifier circuits to meet given specifications such as gain, frequency, power, and area specifications.

TEXT/REFERENCE BOOKS:

1. R. Gregorian and Temes - Analog MOS integrated circuits for signal processing

2. R.Gregorian - Introduction to CMOS opamps and comparators.

3. D.Johns and K.Martin - Analog integrated circuit design

4. B.Razavi - Monolithic Phase-locked loops and clock recovery circuits: Theory and design.

EC1505 DIGITAL SIGNAL PROCESSING LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To perform basic signal processing operations such as Linear Convolution, Circular Convolution, Auto Correlation, Cross Correlation and Frequency analysis in MATLAB
- To implement FIR and IIR filters in MATLAB and DSP Processor
- To study the architecture of DSP processor
- To design a DSP system to demonstrate the Multi-rate and Adaptive signal processing concepts.

LIST OF EXPERIMENTS:

MATLAB SOFTWARE PACKAGE

1. Generation of elementary Discrete-Time sequences
2. Linear and Circular convolutions
3. Auto correlation and Cross Correlation
4. Frequency Analysis using DFT
5. Design of FIR filters (LPF/HPF/BPF/BSF) and demonstrates the filtering operation
6. Design of Butterworth and Chebyshev IIR filters (LPF/HPF/BPF/BSF) and demonstrate the filtering operations
7. Implementation of Up-Sampling and Down-Sampling operation using Matlab.

DSP PROCESSOR BASED IMPLEMENTATION

1. Study of architecture of Digital Signal Processor
2. Generation of various signals
3. Linear and Circular Convolution
4. Design and demonstration of FIR Filter for Low pass, High pass, Band pass and Band stop filtering
5. Implementation of Up-sampling and Down-sampling operation in DSP Processor

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

1. Carryout basic signal processing operations
2. Demonstrate their abilities towards MATLAB based implementation of various DSP systems
3. Analyze the architecture of a DSP Processor
4. Design and Implement the FIR Filters in DSP Processor for performing filtering operation over real-time signals Design a DSP system for various applications of DSP.

EC1506 COMMMUNICATION SYSTEMS LABORATORY

L	T	P	C
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OBJECTIVES:

- To Implement AM & FM modulation and demodulation
- To visualize the effects of sampling and TDM
- To implement PCM & DM
- To simulate Digital Modulation schemes
- To simulate Error control coding schemes

LIST OF EXPERIMENTS:

1. AM Modulator and Demodulator
2. FM Modulator and Demodulator
3. Signal Sampling and reconstruction
4. Pulse Code Modulation and Demodulation
5. Delta Modulation and Demodulation
6. Line coding schemes
7. Simulation of ASK, FSK, BPSK generation and detection schemes
8. Simulation of DPSK, QPSK and QAM generation schemes
9. Simulation of signal constellations of BPSK, QPSK and QAM
10. Simulation of Linear Block error control coding schemes
11. Simulation of Convolutional coding scheme
12. Communication link simulation-AWGN noise Analysis
13. Mini Project

TOTAL PERIODS : 60

COURSE OUTCOMES:

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

1. Simulate & validate the various functional modules of a communication system
2. Demonstrate their knowledge in base band signaling schemes through implementation of digital modulation schemes
3. To understand the basic concepts of A/D and D/A
4. Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system
5. Simulate end-to-end communication Link

EC1507 MICROPROCESSOR and MICROCONTROLLER LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To study introduce the programming language of 8086 and 8051.
- To develop skill in program writing for microprocessors and controllers.
- To introduce microprocessor and microcontroller based system design.
- To impart knowledge on embedded S/W development.

8086 based experiments and Interfacing:

1. Basic arithmetic and Logical operations .
2. Move a data block without overlap
3. Conversion, decimal arithmetic and Matrix operations.
4. String manipulations, sorting and searching Counters Programming
5. Traffic light controller
6. Stepper motor control
7. Digital clock
8. Key board and Display
9. Serial interface and Parallel interface
10. A/D and D/A interface and Waveform Generation
11. 8051 Experiments
12. Basic arithmetic and Logical operations
13. Square and Cube program, Find 2‘s complement of a number
14. Unpacked BCD to ASCII

TOTAL: 60 PERIODS

COURSE OUTCOMES:

1. Write ALP Programmes for Arithmetic operations
2. Interface different I/Os with processor
3. Generate waveforms using Microprocessors
4. Execute Programs in 8051.