J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist., Telangana – 500075

ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE – R16

I B. Tech – I Semester

Sl. No	Code	Subject	L	T-P-D	C
1	E110A	Mathematics – I	3	1-0-0	3
2	E110B	Engineering Chemistry	4	0-0-0	4
3	E110C	Engineering Physics – I	3	0-0-0	3
4	E110D	Professional Communication in English	3	0-0-0	3
5	E113A	Engineering Mechanics	3	1-0-0	3
6	E112A	Basic Electrical and Electronics Engineering	4	0-0-0	4
7	E1101	English Language Communication Skills Lab	0	0-3-0	2
8	E1102	Engineering Workshop	0	0-3-0	2
9	E110F	Professional Ethics	2	0-0-0	0
		Total	**22**	**2-6-0**	**24**

I B.Tech – II Semester

Sl. No	Code	Subject	L	T-P-D	C
1	E120A	Engineering Physics – II	3	0-0-0	3
2	E120B	Mathematics – II	4	1-0-0	4
3	E120C	Mathematics – III	4	1-0-0	4
4	E125A	Computer Programming in C	3	0-0-0	3
5	E123A	Engineering Drawing	2	0-0-4	4
6	E1201	Engineering Chemistry Lab	0	0-3-0	2
7	E1202	Engineering Physics Lab	0	0-3-0	2
8	E1203	Computer Programming in C Lab	0	0-3-0	2
9	E120E	Environmental Studies	2	0-0-0	0
		Total	**18**	**2-9-4**	**24**

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ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE – R16

II B.Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E210B	Complex Analysis and Transforms	4	0-0-0	4
2	E214A	Analog Electronics	4	0-0-0	4
3	E212D	Electrical Technology	4	1-0-0	4
4	E214B	Signals and Systems	3	1-0-0	3
5	E214F	Probability Theory and Stochastic Processes	3	1-0-0	3
6	E2111	Basic Electronics Lab	0	0-3-0	2
7	E2112	Basic Simulation Lab	0	0-3-0	2
8	E2113	Electrical Technology Lab	0	0-3-0	2
9	E2114	Gender Sensitization	0	0-3-0	0
		Total	**18**	**3-12-0**	**24**

II B.Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E224A	Switching Theory and Logic Design	4	0-0-0	4
2	E224B	Pulse and Digital Circuits	4	0-0-0	4
3	E224C	Control Systems	4	1-0-0	4
4	E224D	Analog Communications	3	1-0-0	3
5	E224E	Electromagnetic Theory and Transmission Lines	3	1-0-0	3
6	E2212	Analog Communications Lab	0	0-3-0	2
7	E2213	Pulse and Digital Circuits Lab	0	0-3-0	2
8	E2214	Analog Electronics Lab	0	0-3-0	2
		Total	**18**	**3-9-0**	**24**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
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ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE – R16

III B.Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E314A	Antenna and Wave Propagation	4	1-0-0	4
2	E314B	Linear and Digital IC Applications	4	0-0-0	4
3	E314C	Digital Communications	4	1-0-0	4
4	E310B	Management Science	3	0-0-0	3
5		**Open Elective – I**	3	0-0-0	3
6	E3110	Linear IC Applications Lab	0	0-3-0	2
7	E3111	Digital Communications Lab	0	0-3-0	2
8	E3112	Digital IC Applications Lab	0	0-3-0	2
		Total	**18**	**2-9-0**	**24**

III B.Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E324A	Microprocessors and Microcontrollers	4	0-0-0	4
2	E324B	Digital Signal Processing	4	1-0-0	4
3		**Open Elective – II**	3	1-0-0	3
4		**Professional Elective – I**	4	0-0-0	4
5		**Professional Elective – II**	4	0-0-0	4
6	E3210	Microprocessors and Microcontrollers Lab	0	0-3-0	2
7	E3211	Digital Signal Processing Lab	0	0-3-0	2
8	E3212	Employability Skills	0	0-2-0	1
		Total	**19**	**2-8-0**	**24**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist., Telangana – 500075

ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE – R16

IV B.Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E414A	Microwave Engineering	4	0-0-0	4
2	E414B	VLSI Design	4	0-0-0	4
3		**Professional Elective – III**	4	0-0-0	4
4		**Professional Elective – IV**	4	0-0-0	4
5		**Professional Elective – V**	4	0-0-0	4
6	E4107	Microwave Engineering Lab	0	0-3-0	2
7	E4108	Industry Oriented Mini Project	0	0-0-0	2
		Total	**20**	**0-3-0**	**24**

IV B.Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	E424A	Electronics Measurement and Instrumentation	4	0-0-0	4
2		**Open Elective – III**	3	1-0-0	3
3	E4210	VLSI Lab	0	0-3-0	2
4	E4211	Seminar	0	0-3-0	1
5	E4212	Major Project	0	0-0-0	14
		Total	**7**	**1-6-0**	**24**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lecture, T – Tutorial, P – Practical, D – Drawing, C – Credits.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
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ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE – R16

Professional Elective - I

Sl. No	Code	Subject	L	T-P-D	C
1	E324C	Computer Organization and Operating Systems	4	0-0-0	4
2	E324D	Spread spectrum communications	4	0-0-0	4
3	E324E	Digital System Design	4	0-0-0	4

Professional Elective - II

Sl. No	Code	Subject	L	T-P-D	C
1	E324F	RF Circuits Design	4	0-0-0	4
2	E324G	Telecommunication Switching Systems and Networks	4	0-0-0	4

Professional Elective - III

Sl. No	Code	Subject	L	T-P-D	C
1	E414C	Cellular and Mobile Communications	4	0-0-0	4
2	E414D	Computer Networks	4	0-0-0	4
3	E414E	DSP Processors and Architectures	4	0-0-0	4
4	E414F	Optical Communication	4	0-0-0	4

Professional Elective - IV

Sl. No	Code	Subject	L	T-P-D	C
1	E414G	Satellite communications	4	0-0-0	4
2	E414H	Embedded System Design	4	0-0-0	4
3	E414I	Network Security and Cryptography	4	0-0-0	4
4	E414J	Wireless Communications and Networks	4	0-0-0	4

Professional Elective - V

Sl. No	Code	Subject	L	T-P-D	C
1	E414K	Radar Systems	4	0-0-0	4
2	E414L	Coding Theory and Techniques	4	0-0-0	4
3	E414M	Television Engineering	4	0-0-0	4
4	E414N	Digital Image Processing	4	0-0-0	4

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist , Telangana-500075

COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – I

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E31OC	Disaster Management	Civil Engineering
2	E31OD	Elements of Civil Engineering	Civil Engineering
3	E31OE	Network Analysis and Synthesis	Electrical and Electronics Engineering
4	E31OF	Measurements and Instruments	Electrical and Electronics Engineering
5	E31OG	Automobile Engineering	Mechanical Engineering
6	E31OI	Engineering Materials and Fabrication Processes	Mechanical Engineering
7	E31OJ	Principles of Electronic Communications	Electronics and Communication Engineering
8	E31OK	Matlab Programming	Electronics and Communication Engineering
9	E31OL	Data Structures through C	Computer Science and Engineering
10	E31OM	Python Programming	Computer Science and Engineering
11	E31ON	E-Disaster Management	Information Technology
12	E31OO	Human Computer Interaction	Information Technology
13	E31OP	Introduction to Microprocessors and Microcontrollers	Electronics and Computer Engineering
14	E31OQ	Internet of Things	Electronics and Computer Engineering

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist , Telangana-500075

COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – II

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E32OA	Estimation, Quantity Survey & Valuation	Civil Engineering
2	E32OB	Waste Management	Civil Engineering
3	E32OC	Non-Conventional Energy Sources and Applications	Electrical and Electronics Engineering
4	E32OD	Electrical Technology	Electrical and Electronics Engineering
5	E32OE	Operation Research	Mechanical Engineering
6	E32OG	Nanotechnology	Mechanical Engineering
7	E32OH	Applications of Micro Processors and Controllers	Electronics and Communication Engineering
8	E32OI	Fundamentals of HDL	Electronics and Communication Engineering
9	E32OJ	Database Management Systems	Computer Science Engineering
10	E32OK	Cloud Computing	Computer Science Engineering
11	E32OL	E-Waste Management	Information Technology
12	E32OM	Introduction to Web Design	Information Technology
13	E32ON	Introduction to Embedded systems	Electronics and Computer Engineering
14	E32OO	Fundamentals of E-Commerce	Electronics and Computer Engineering

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY

UGC AUTONOMOUS

Bhaskar Nagar, Yenkapally, Moinabad (M), RR Dist , Telangana-500075

COURSE STRUCTURE – R16

List of Subjects offered by various Board of Studies

Open Elective – III

S. No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	E42OA	Environmental Impact Assessment	Civil Engineering
2	E42OB	Green Building Technology	Civil Engineering
3	E42OC	Materials in Electrical Systems	Electrical and Electronics Engineering
4	E42OD	Field Theory and Circuits	Electrical and Electronics Engineering
5	E42OE	Reliability Engineering	Mechanical Engineering
6	E42OG	Special Manufacturing Processes	Mechanical Engineering
7	E42OH	Principles of Computer Communication and Networks	Electronics and Communication Engineering
8	E42OI	Speech Processing	Electronics and Communication Engineering
9	E42OJ	Soft Computing	Computer Science Engineering
10	E42OK	E-commerce	Computer Science Engineering
11	E42OL	Internet of Things	Information Technology
12	E42OM	Semantic Web and Social Networks	Information Technology
13	E42ON	Fundamentals of Intelligence Systems	Electronics and Computer Engineering
14	E42OO	Introduction to Neural Networks	Electronics and Computer Engineering

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

(E110A) MATHEMATICS – I

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM)

Prerequisites: Foundation course (No prerequisites)**.**

Course Objectives:

The student will

1. understand the methods of solving the linear differential equations of first and higher order and applications of the differential equations.
2. recognize the types of matrices and their properties and the concept of rank of a matrix and applying the same to understand the consistency.
3. learn how to solve the linear systems and the concepts of eigen values and eigen vectors and reducing the quadratic forms into their canonical forms.
4. equipped with the concept of total derivative and finding maxima and minima of functions of two variables.
5. formation of the partial differential equations and solving the first order equations.

UNIT–I: Initial Value Problems and Applications

Exact differential equations - Reducible to exact. Linear differential equations of higher order with constant coefficients: Non homogeneous terms with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)-Operator form of the differential equation. Finding particular integral using inverse operator, Wronskian of functions, method of variation of parameters. Applications: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories, Electrical circuits.

UNIT–II: Linear Systems of Equations

Types of real matrices and complex matrices, rank, echelon form, normal form, consistency and solution of linear systems (homogeneous and Non-homogeneous) - Gauss elimination.

Gauss Jordon and LU decomposition methods- Applications: Finding current in the electrical circuits.

UNIT–III: Eigen values, Eigen Vectors and Quadratic Forms

Eigen values, Eigen vectors and their properties, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem.

Diagonalization, Quadratic forms, Reduction of Quadratic forms into their canonical form, rank and nature of the Quadratic forms – Index and signature.

UNIT–IV: Partial Differentiation

Introduction of partial differentiation, homogeneous function, Euler's theorem, total derivative, Chain rule, Taylor's and Mclaurin's series expansion of functions of two variables, functional dependence, Jacobian.

Applications: maxima and minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT-V: First Order Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions.

Lagranges method to solve the first order linear equations and the standard type methods to solve the non linear equations.

Text Books:

1. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
2. A first course in differential equations with modeling applications by Dennis G. Zill, Cengage Learning publishers.

References:

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons Publisher.
2. Engineering Mathematics by N. P. Bali, Lakshmi Publications.

Course Outcomes:

The student will be able to

1. solve higher order DE's and apply them for solving some real world problems.
2. write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
3. analyze the Eigen values and Eigen vectors which come across under linear transformations.
4. examine the values of functions of two variables with/ without constraints.
5. solve linear partial differential equations of first order.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**4**	**0-0-0**	**4**

(E110B) ENGINEERING CHEMISTRY

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM **)**

Course Objectives:

The Student will

1. acquire the skills to critically assess and solve problems related to water requiring the application of chemical principles.
2. be made familiar with research design methodology and to use problem-solving techniques associated with electrochemistry.
3. understand to organize and present chemical information coherently through oral and written discourse based on polymers.
4. learn how be to apply science and engineering in the analysis and evaluation of process involved in production of energy efficient fuels.
5. be equipped with the ability to invent or discover new environmental friendly , energy efficient and economically effective engineering materials in a sustainable manner.

UNIT-I: Water and its treatment

Introduction – hardness of water – causes of hardness – types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Numerical problems. Potable water and its specifications- Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and Ozonization. Defluoridation – Nalgonda technique - Determination of F^- ion by ion-selective electrode method.

Boiler troubles:

Sludges, scales and Caustic embrittlement. Internal treatment of Boiler feed water (Calgon conditioning – Phosphate conditioning - Colloidal conditioning) .Softening of water by ion-exchange processes. Desalination of water – Electrodialysis & Reverse osmosis. Numerical problems.

UNIT-II: Electrochemistry and Batteries

Electrochemistry: Electrode- electrode potential, standard electrode potential, types of electrodes – Construction and functioning of Standard hydrogen electrode, calomel, Quinhydrone and glass electrode. Nernst equation - electrochemical series and its applications. Electrochemical cells: Daniel cell – cell notation, cell reaction and cell emf – Potentiometric titrations and Applications- Determination of pH and EMF. Concept of concentration cells-electrolyte concentration cell. Numerical problems.

Batteries: Cell and battery - Primary battery (dry cell, alkaline cell and Lithium cell) and Secondary battery (lead acid, Ni-Cd and lithium ion cell), **Fuel cells:** Hydrogen –oxygen, phosphoric acid and methanol-oxygen fuel cells – Applications.

UNIT-III: Polymers

Definition – Classification of polymers with examples – Types of polymerization – addition and condensation polymerization with examples. **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and engineering applications of PVC and Bakelite.

Fibers: Characteristics of fibers – preparation, properties and applications of Nylon-6, 6 and Dacron. Kevlar- Liquid crystal polymers-Applications.

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT-IV: Fuels and Combustion

Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG.

Combustion: Definition, Calorific value of fuel – HCV, LCV-Dulongs Formula; Calculation of air quantity required for combustion of a fuel.

UNIT-V: Engineering Materials and applications

Lubricants-Classification of lubricants with examples-characteristics of good lubricants – mechanism of lubrication-properties of lubricants.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Nanomaterials: Introduction, Preparation-Top down & bottom up process-sol gel method and self assembly process. Applications of nonmaterial's.

Composites: Introduction- Constituents of composites – advantages, classification and constituents of composites. Fiber reinforced plastics (FRP). Applications of composites.

Text books:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, New Delhi.
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, New Delhi.

Reference Books:

1. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi.
2. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi.
3. Engineering Chemistry by Thirumala Chary and Laxminarayana, Scitech Publishers, Chennai.

Course Outcomes:

The student will be able to:

1. identify the suitability of water for domestic and industrial purposes.
2. apply the basic principle of electro chemistry.
3. design the new polymeric materials for engineering applications.
4. develop innovative methods and engineering materials that are useful in every walk of life.
5. apply new chemical techniques for the production of fuels that are useful in every walk of life.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

(E110C) ENGINEERING PHYSICS-I

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM**)**

Course Objectives:

The Student will

1. understand interaction of light with matter through interference, diffraction and polarization.
2. distinguish between ordinary light with a laser light and to realize propagation of light through optical fibers.
3. understand various crystal systems and there structures elaborately.
4. study various crystal imperfections and probing methods like X-RD.
5. study the concepts of latest developments in fiber optics.

UNIT-I : Crystallography

Space lattice, unit cell and lattice parameters, crystal systems, Bravais lattices, atomic radius, co-ordination number and packing factor of SC, BCC, FCC, HCP and diamond. Miller indices, crystal planes and directions, inter planar spacing of orthogonal crystal systems.

UNIT-II : X-ray Diffraction and Defects in Crystals

Bragg's law, X-ray diffraction methods: Laue method, powder method; point defects: vacancies, substitutional, interstitial.

Frenkel and Schottky defects, line defects (qualitative) and Burger's vector, surface defects: stacking faults, twin, tilt and grain boundaries.

UNIT-III: Fiber Optics

Principle of optical fiber, construction of fiber, acceptance angle and acceptance cone, numerical aperture.

Types of optical fibers: step index and graded index fibers, attenuation in optical fibers, applications of optical fibers in medicine and sensors**.**

UNIT-IV: Interference

Coherence, division of amplitude and division of wave front, interference in thin films (transmitted and reflected light), Newton's rings experiment.

Diffraction: Distinction between Fresnel and Fraunhoffer diffraction, diffraction due to single slit, N-slits, Diffraction grating experiment.

UNIT-V: Polarization

Introduction, Malus's law, double refraction, Nicol prism, Quarter wave and half wave plates.

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation,

Einstein coefficients, populatio n inversion, ruby laser, helium – neon laser, semi conductor laser, applications of lasers.

TEXT BOOKS:

1. Applied Physics – P.K.Mittal (I.K.Internationalhosesepvt Ltd) (New Edition)
2. Engineering Physics-P.K Palaniswamy (Scitech Publications India) Pvt Ltd, Fifth Print 2010).

REFERENCES

1. Engineering Physics-Senthilkumar ((VRB Publishers Limited,)
2. Applied Physics for Engineers – A.J. Dekker (Macmillan).
3. Elements of Material Science – V.Raghavant (PHI Publications).

Course outcomes:

The student will be able to:

1. distinguish between various crystal systems
2. identify the crystal defects by using X-RD
3. describe principles of fiber optics, different types of fiber optics and its applications.
4. identify concept of reflection and refraction rules of light in different medium.
5. identify characteristics of laser, working of various laser systems and light propagation through optical fibers.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

(E110D) PROFESSIONAL COMMUNICATION IN ENGLISH

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM)

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic and communicative competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text book for detailed study. The students should be encouraged to read the texts/poems silently leading to reading comprehension. Reading comprehension passages are given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, from newspaper articles, advertisements, promotional material, etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills.

Course Objectives:

The student will:

1. understand the speech of Dr.APJ Abdul Kalam.
2. know how Satya Nadella succeeded in his life.
3. learn the concept of technical communication.
4. learn how to behave with everyone.
5. know the influence of parents in their life.

SYLLABUS

Reading Skills:

Objectives:

1. To develop an awareness in students about the significance of silent reading and comprehension.
2. To develop students' ability to guess meanings of words from the context and grasp the overall message of the text, draw inferences, etc.
3. Skimming and Scanning the text.
4. Intensive and Extensive Reading.
5. Reading for Pleasure.
6. Identifying the topic sentence.

NOTE: The students will be trained in reading skills using the prescribed texts for detailed study. They will be tested in reading comprehension of different 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:

Objectives:

1. To develop an awareness in the students about writing as an exact and formal skill.
2. To create an awareness in students about the components of different forms of writing, beginning with the lower order ones through.
3. Writing of sentences.
4. Use of appropriate vocabulary.
5. Paragraph writing.
6. Coherence and cohesiveness.
7. Narration / description.
8. Note Making.
9. Formal and informal letter writing.
10. Describing graphs using expressions of comparison.

In order to improve the proficiency of the students in the acquisition of language skills mentioned above, the following text and course contents, divided into Five Units are prescribed:

UNIT –I:

Chapter entitled '**Presidential Address' by Dr. A.P.J. Kalam** from **"Fluency in English– A Course book for Engineering Students"** published by Orient BlackSwan, Hyderabad.

Vocabulary: Word Formation -- Root Words --The Use of Prefixes and Suffixes– Collocations– Exercises for Practice.

Grammar: Punctuation – Parts of Speech- Articles -Exercises for Practice.

Reading: Double Angels by David Scott-Reading and Its Importance- Techniques for Effective Reading- Signal Words- Exercises for Practice

Writing: Writing Sentences- Techniques for Effective Writing-- Paragraph Writing-Types, Structure and Features of a Paragraph-Coherence and Cohesiveness: Logical, Lexical and Grammatical Devices - Exercises for Practice.

UNIT –II:

Chapter entitled **Satya Nadella: Email to Employees on his First Day as CEO** from **"Fluency in English– A Course book for Engineering Students"** Published by Orient BlackSwan, Hyderabad.

Vocabulary: Synonyms and Antonyms – Homonyms, Homophones, Homographs- Exercises for Practice (Chapter 17 '**Technical Communication- Principles**

and Practice'.

Third Edition published by Oxford University Press may also be followed.)

Grammar: Verbs-Transitive, Intransitive and Non-finite Verbs – Mood and Tense— Gerund – Words with Appropriate Prepositions – Phrasal Verbs - Exercises for Practice.

Reading: Sub-skills of Reading- Skimming, Scanning, Extensive Reading and Intensive Reading - **The Road Not Taken** by **Robert Frost** -- Exercises for Practice

Writing: Letter Writing –Format, Styles, Parts, Language to be used in Formal Letters- Letter of Apology – Letter of Complaint-Letter of Inquiry with Reply – Letter of Requisition –- Exercises for Practice.

UNIT –III:

From the book entitled '**Technical Communication- Principles and Practice'. Third Edition** published by Oxford University Press.

Vocabulary: Introduction- A Brief History of Words – Using the Dictionary and Thesaurus– Changing Words from One Form to Another – Confusables (From Chapter 17 entitled 'Grammar and Vocabulary Development')

Grammar: Tenses: Present Tense- Past Tense- Future Tense- Active Voice – Passive Voice- Conditional Sentences – Adjective and Degrees of Comparison. (From Chapter 17 entitled 'Grammar and Vocabulary Development')

Reading: Improving Comprehension Skills – Techniques for Good Comprehension- Skimming and Scanning- Non-verbal Signals – Structure of the Text – Structure of Paragraphs – Punctuation – Author's viewpoint (Inference) – Reader Anticipation: Determining the Meaning of Words – Summarizing- Typical Reading Comprehension Questions. (From Chapter 10 entitled 'Reading Comprehension')

Writing: Introduction- Letter Writing-Writing the Cover Letter- Cover Letters Accompanying Resumes- Emails. (From Chapter 15 entitled 'Formal Letters, Memos, and Email')

UNIT –IV:

Chapter entitled **'Good Manners' by J.C. Hill** from **Fluency in English – A Course book for Engineering Students"** published by Orient Blackswan, Hyderabad.

Vocabulary: Idiomatic Expressions –One- word Substitutes --- Exercises for Practice (Chapter 17 '**Technical Communication- Principles and Practice'. Third Edition** published by Oxford University Press may also be followed.)

Grammar: Sequence of Tenses- Concord (Subject in Agreement with the Verb) – Exercises for Practice.

Reading: **'If'** poem by **Rudyard Kipling**--Tips for Writing a Review --- Author's Viewpoint – Reader's Anticipation-- Herein the Students will be required to Read and Submit a Review of a Book (Literary or Non-literary) of their choice
– Exercises for Practice.

Writing: Information Transfer-Bar Charts-Flow Charts-Tree Diagrams etc., -- Exercises for Practice.
Introduction - Steps to Effective Precis Writing – Guidelines- Samples (Chapter 12 entitled 'The Art of Condensation' from **Technical Communication-Principles and Practice. Third Edition** published by Oxford University Press)

UNIT –V:

Chapter entitled **'Father Dear Father' by Raj Kinger** from **Fluency in English – A Course book for Engineering Students"** Published by Orient BlackSwan, Hyderabad

Vocabulary: Foreign Words—Words borrowed from other Languages- Exercises for Practice.

Grammar: Direct and Indirect Speech- Question Tags- Exercises for Practice

Reading: Predicting the Content- Understanding the Gist – SQ3R Reading Technique- Study Skills – Note Making - Understanding Discourse Coherence – Sequencing Sentences. (From Chapter 10 entitled **'Reading Comprehension' -**
Technical Communication- Principles and Practice. Third Edition published by Oxford University Press.)

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories Of Reports –Formats- Prewriting – Structure of Reports (Manuscript Format) - Types of Reports - Writing the Report. (From Chapter 13 entitled **'Technical Reports' - Technical Communication- Principles and Practice. Third Edition** published by Oxford University Press.)

Text Books :

1. **"Fluency in English – A Course book for Engineering Students"** by Board of Editors**:**
   Hyderabad: Orient BlackSwan Pvt. Ltd. 2016. Print.
2. Raman, Meenakshi and Sharma, Sangeeta**. "Technical Communication- Principles and Practice". Third Edition. New Delhi: Oxford University Press. 2015. Print.**

Reference Books :

1. Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)
2. Rizvi, M. Ashraf. Effective Technical Communication. Tata Mc Graw –Hill. 2015 (Print).

Course Outcomes:

The student will be able to:

1. identify himself and try to develop the nation.
2. implement how to dedicate themselves for the development of their organization and career.
3. use of technical vocabulary properly.
4. develop good manners in their life.
5. realize their parent's consciousness towards them.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

(E113A) ENGINEERING MECHANICS

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM **)**

Course Objectives:

The student will

1. read the concept of system of forces and its applications.
2. determine the centroid and centre of Gravity of different structures.
3. understand the concept of inertia and its real time applications.
4. analyze the bodies in motion.
5. analyse as a Particle and Analysis as a Rigid Body in Translation.

UNIT–I: **Introduction to Engineering Mechanics**

Basic Concepts. Systems of Forces: Coplanar Concurrent Forces–Forces in Space–Moment of Force and its Application–Couples and Resultant of Force Systems.

Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems -Equilibrium of Spatial Systems.

UNIT–II: Centroid

Centroids of simple figures (from basic principles)–Centroids of Composite Figures.

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorem.

UNIT–III: Area moment of Inertia : Definition–Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

UNIT–IV: Kinematics: Rectilinear and Curvilinear motions–Velocity and Acceleration–Motion of Rigid Body Types and their Analysis in Planar Motion.

UNIT–V: **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation–Central Force Motion Equations of Plane Motion–Fixed Axis Rotation–Rolling Bodies.

TEXT BOOKS:

1. Engineering. Mechanics / Timoshenko & Young.
2. Engineering Mechanics, Basudev Bhattacharya, Oxford Univ. Press, New Delhi, Second Edition, 2014.
3. Engineering Mechanics / Fedinand . L. Singer / Harper–Collins.

REFERENCES:

1. Engineering Mechanics / Fedinand . L. Singer / Harper–Collins.

2. Engineering Mechanics / S.S. Bhavikatti & J.G. Rajasekharappa.
3. Engineering Mechanics / Irving. H. Shames Prentice–Hall.

Course outcomes:

The student will be able to

1. recognize the resultant of a force system acting on an object.
2. identify the surface area of complex objects.
3. relate with application of different theorems of moment of inertia.
4. identify the kinematics involved in a moving object.
5. analyze the bodies in motion.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**4**	**0-0-0**	**4**

(E112A) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM)

Course Objectives:

The student will

1. describe Electric Circuits.
2. acquire knowledge the given circuit with various theorems and methods.
3. learn in recognizing of basic electronic devices such as Diodes, Transistors, to build circuits like amplifiers and oscillators etc.
4. acquire knowledge on the various parameters useful for designing electronic system.
5. acquire the knowledge of various configurations, characteristics and applications.

UNIT – I: Electrical circuits:

R-L-C Parameters, voltage and current, Independent and Dependent Sources, Source Transformation-V-I relationship for passive elements, Kirchhoff's Laws, Network reduction techniques-series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis.

Single Phase AC Circuits : R.M.S. and Average values, Form Factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance –phase and phase difference, concept of power factor, phasor notation, complex and polar forms of representation.

UNIT-II: Resonance:

Series and parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for various parameters.

Network Theorems: Thevenin's, Norton's, Maximum power Transfer, Superposition, Reciprocity, Tellegen's, Milliman's and Compensation theorems for DC and AC excitations.

UNIT-III: P-N Junction Diode:

P-N junction as a Diode, Symbol, Diode equation, volt-Ampere characteristics, Temperature dependence, Ideal versus practical Diode, static and dynamic resistances, Diffusion and Transition Capacitances.

Rectifiers and Filters: Diode rectifier: Half wave Rectifier, Ripple Factor-Full Wave Rectifier, Bridge Rectifier, Rectifiers with Filters: Inductive Filters, Capacitive Filters, L-section Filters, π- section Filters.

UNIT-IV: Bipolar Junction Transistor (BJT):

Symbol, Construction, principle of Operation, Current Components in a junction transistor

Common Emitter, Common Base and Common Collector configurations.
Transistor Biasing -Operating point, DC and AC load lines, Fixed Bias, Collector to Base bias, Self Bias (Voltage divider bias), Bias stability, Stabilization against variations in V_{BE} , β, and $I_{co.}$
Small signal Transistor Analysis, h- Parameters, Definitions, Determination of h-parameters from CE transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters and their Comparison.

UNIT-V: Junction Field Effect Transistor
Construction, Principle of Operation, pinch-off voltage, Volt-Ampere characteristics, comparison of BJT and JFET, small signal Model, MOSFET: Depletion and Enhancement FETs-construction characteristics.
Special Purpose Devices: Breakdown Mechanisms in semi-Conductor Diodes, Zener diode characteristics, Zener diode as a simple regulator, principle of operation and Characteristics of Tunnel Diode (with help of Energy band diagram), Varactor Diode, Principle of operation of SCR.

TEXT BOOKS:
1 Millman's Electronic Devices and circuits – J.Millman and C.Halkias, Mc Graw Hill Mc Graw Hill.
2. Micro Electronics by David bell.

REFERENCES:
1. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
2. Network Theory by N.C.Jagan and C.Lakshminarayana, B.S.Publications.
3. Electronic Devices and Circuits- R.L.Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.

Course Outcomes:
The student will be able to:
1. demonstrate strong fundamental back ground in Electrical Engineering.
2. analyze and solve problems of ac and dc circuits.
3. identify the value of different resistors.
4. analyze and design various electronic circuits through various numerous
5. design examples using currently-available devices and standard-value components

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

(E1101) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM **)**

The **English Language Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

The student will:

1. recognize sounds of English .
2. apply stress and intonation while speaking .
3. develop Listening skills.
4. develop intoducing himself and others.
5. understand how to describe, debate and knows the types of presentations.

Syllabus: English Language Communication Skills Lab (ELCS) shall have two parts:

1. **Computer Assisted Language Learning (CALL) Lab**
2. **Interactive Communication Skills (ICS) Lab**

Listening Skills:

Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

1. Listening for general content
2. Listening to fill up information
3. Intensive listening
4. Listening for specific information

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts :

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities

- Just A Minute (JAM) Sessions.

The following course content is prescribed for the **English Language Communication Skills Lab**.

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker.

Testing Exercises.

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Sentence Stress – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms-Sentence Stress – Intonation.

Testing Exercises.

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation.

Testing Exercises.

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines.

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions –

Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

Testing Exercises.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication- Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

Testing Exercises.

ICS Lab:

Understand: Group Discussion- Interview Skills.

Practice: Group Discussion- Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

   The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

   System Requirement (Hardware component):

   Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

   Computers with Suitable Configuration, High Fidelity Headphones

2. **Interactive Communication Skills (ICS) Lab:**

   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio and video system and camcorder etc.

Lab Manuals:

1) A book entitled "**ELCS Lab Manual – A Workbook for CALL and ICS Lab Activities"** by Board of Editors: Hyderabad: Orient BlackSwan Pvt. Ltd. 2016. Print.
2) Hart, Steve; Nair, Aravind R.; Bhambhani, Veena. **"EMBARK- English for undergraduates"** Delhi: Cambridge University Press. 2016. Print.

Suggested Software:

1) Cambridge Advanced Learners' English Dictionary with CD.
2) Grammar Made Easy by Darling Kindersley.
3) Punctuation Made Easy by Darling Kindersley.
4) Oxford Advanced Learner's Compass, 8th Edition.
5) English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6) English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
7) TOEFL and GRE (KAPLAN, AARCO and BARRONS, USA, Cracking GRE by CLIFFS).

References:

1) Jayashree Mohanraj, Let Us Hear Them Speak. New Delhi: Sage Texts. 2015. Print. Hancock, M. English Pronunciation in Use. Intermediate Cambridge: Cambridge University Press. 2009. Print.

Course Outcomes:

The student will be able to:

1. develop correct pronunciation.
2. use stress and intonation properly while speaking and writing.
3. develop listening skills .
4. describe himself and others in day to day life situations.
5. acquire debating and oral presentation skills.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

(E1102) ENGINEERING WORKSHOP

(Common to Civil, EEE, ME, ECE,CSE, IT, ECM **)**

Course Objectives:

The student will

1. execute application of various tools in carpentry, lathe machine works, house wiring.
2. recognize application of metal cutting and drilling.
3. analyse to perform various shape of wood material and metals.
4. fabricate metal items using welding and power tools.
5. demonstrate the works in foundry and plumbing.

TRADES FOR EXPERIMENT:

1. Carpentry.
2. Fitting.
3 .Tin-Smithy and Development of jobs carried out and soldering.
4. Black Smithy.
5. House-wiring.
6. Foundry.
7. Welding.

TRADES FOR DEMONSTRATION AND EXPOSURE:

8. Plumbing, Machine Shop.
9. Power tools in construction.
10. wood working.
11. Mechanical engineering.

Course Outcomes:

The student will be able to

1. identify the tools used in workshop of different trades.
2. practice the carpentry works of small shape and size.
3. demonstrate the basic fitting and electrical works using the required tools.
4. fabricate metal items using welding and power tools.
5. demonstrate the works in foundry and plumbing.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - I Semester	**2**	**0-0-0**	**0**

(E110F) PROFESSIONAL ETHICS
(Common to ECE, EEE& ECM)

Course Objectives:
The student will :

1. learn ethical values and attitudes.
2. understand the roles of a professional.
3. understand the current scenario and engineers responsibility towards the society
4. know the types of professional ethical codes.
5. learn the need for ethical audit.

UNIT - I: Basic Concepts
Introduction, Difference between Ethics/values/Morals, , emotional, intelligence, Indian and western thoughts on ethics, value education, dimensions of ethics.

Setting goals in life, importance of morality and ethics, basic ethical principles, classification of ethical codes, how to achieve autonomy.

UNIT - II: Professional Ethics
Meaning of profession, professionalism, professional's roles and professional risks, professional accountability, successful professional, engineering professionals.

Engineering ethics, roles of engineers, rights and responsibilities as citizens, professional responsibilities, professional rights.

UNIT - III: Global issues and safety
Introduction, current scenario, business ethics, environmental ethics, computer ethics, ethical hacking and its dilemma.

Ethics in research, intellectual property rights, patents, trademarks, managers and engineers responsibility and case studies.

UNIT - IV: Ethical codes and audits
Introduction need and types of professional ethical codes, sample standard codes, ethical codes for corporate entities and non-profit organization,

Charitable institutions, limitations of the codes, need for ethical audit, ethical profile of organizations.

UNIT - V: Human values and ethical living
Introduction, domains of learning, human values, attitudes, needs and wants of life, harmony in life
Styles of ethical living / models of ethical living, case studies.

Text Books:

1. **Professional ethics** and human value by D.R.Kiran, Tata McGraw Hills education.
2. **Ethics in engineering** by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.

Reference Books:

1. **Fundamental of Ethics** by Edmund G Seebauer and Robert L.Barry, Oxford University press.
2. **Professional ethics** and human values by R.S.Nagarajan, New age international.
3. **Professional ethics** by R. Subramanian, Oxford press.

Course Outcomes:

The student will be able to:

1. use of ethical values and attitudes in their life.
2. implement once he/she becomes a professional.
3. solve the issues related with environment and technology.
4. apply the different types of professional ethical codes in their organization.
5. use of the rules framed by the auditors.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

(E120A) ENGINEERING PHYSICS – II
(Common to EEE, ECE,CSE,IT&ECM)

Course Objectives:
The student will:

1. understand the behaviour of a particle quantum mechanically.
2. distinguish pure and impure semi conductors and understand formation of P-N Junction.
3. understand various magnetic and dielectric properties of materials.
4. reads super conductor behaviour of materials.
5. practical focus in this curriculum is on nanostructured materials, their structural and mechanical properties, and their applications.

UNIT - I: Principles of Quantum Mechanics
Waves and particles, de-Broglie hypothesis, matter waves, Davisson and Germer experiment, Heisenberg uncertainty principle, Schrodinger time independent wave equation, physical significance of wave function, particle in 1-D potential box, electron in periodic potential, Kronig-Penny model (qualitative treatment), E-K curve, origin of energy band formation in solids.

UNIT - II: Semiconductor Physics
Fermi level in intrinsic and extrinsic semiconductors, calculation of carrier concentration in intrinsic & extrinsic semiconductors, direct and indirect band gap semiconductors, formation of PN junction, open circuit PN junction, energy diagram of PN junction diode, solar cell: I-V characteristics and applications.

UNIT - III: Dielectric Properties
Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic, ionic and orientation polarizations and calculation of their polarizabilitites, internal field, Clausius-Mossotti relation, Piezoelectricity, pyroelectricity and ferroelectricity-$BaTiO_3$ structure.

UNIT - IV: Magnetic Properties & Superconductivity
Permeability, field intensity, magnetic field induction, magnetization, magnetic susceptibility, origin of magnetic moment, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, hysteresis curve based on domain theory, soft and hard magnetic materials, properties of anti-ferro and ferri magnetic materials, Superconductivity: Superconductivity phenomenon, Meissner effect, applications of superconductivity.

UNIT - V: Introduction to nanoscience:
Origin of nanoscience, nanoscale, surface to volume ratio,quantum confinement, dominance of electromagnetic forces, random molecular motion, bottom-up fabrication: Sol-gel, CVD and PVD techniques, top-down fabrication: ball mill method,characterization

by XRD, SEM and TEM.

TEXT BOOKS:

1. Solid State Physics, A. J. Dekkar, Macmillan publishers Ind. Ltd.,
2. Solid State Physics, Chales Kittel, Wiley student edition.
3. Fundamentals of Physics, Alan Giambattisa, BM Richardson and Robert C Richardson,Tata McGraw hill Publishers.

REFERENCES:

1. Modern Engineering Physics, K. Vijaya Kumar, S. Chandralingam S. Chand & Co. Pvt. Ltd.
2. University Physics, Francis W. Sears, Hugh D. Young, MarleZeemansky and Roger A Freedman, Pearson Education.
3. Fundamentals of Acoustics, Kinster and Frey, John Wiley and Sons.
4. Introduction to Quantum Mechanics Leonard I. Schiff McGraw-Hill.

Course Outcomes:

The student will be able to:

1. identify the behaviour of a particles in quantum mechanics.
2. analyze the properties of semiconducting materials and devices.
3. categorize various magnetic dielectric properties and apply them in engineering applications.
4. analyze the basic principles and applications of super conductors.
5. demonstrate a working knowledge of nanotechnology principles and industry applications.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

(E120B) MATHEMATICS – II

(Common to EEE, ECE,CSE,IT&ECM)

Course Objectives:

The Student will:

1. understand the concepts & properties of Laplace transforms and solving differential equations using Laplace transform techniques.
2. examine the evaluation of integrals using beta and gamma functions.
3. describe multiple integrals and applying them to compute the volume and areas of regions and the physical quantities involved in engineering field related to the vector valued functions.
4. evaluate the basic properties of vector valued functions and their applications.
5. describe the Vector integral theorems on line, surface and volume integrals

UNIT–I: Laplace Transforms

Laplace transforms of standard functions, Shifting theorems, derivatives and integrals, properties- Unit step function, Dirac's delta function, Periodic function, Inverse Laplace transforms, Convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT-II: Beta and Gamma Functions

Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

Applications: Evaluation of integrals.

UNIT–III: Multiple Integrals

Double and triple integrals, Change of variables, Change of order of integration.

Applications: Finding areas, volumes& Center of gravity (evaluation using Beta and Gamma functions).

UNIT–IV: Vector Differentiation

Scalar and vector point functions, Gradient, Divergence, Curl and their physical and geometrical interpretation, Laplacian operator, Vector identities.

UNIT–V: Vector Integration Line Integral, Work done, Potential function, area, surface and volume integrals, Vector integral theorems: Greens, Stokes and Gauss divergence theorems (without proof) and related problems.

TEXT BOOKS:

1. Advanced Engineering Mathematics by R K Jain & S R K Iyengar, Narosa Publishers.
2. Engineering Mathematics by Srimanthapal and Subodh **C.** Bhunia, Oxford Publishers.

REFERENCES:

1. Advanced Engineering Mathematics by Peter V. O. Neil, Cengage Learning Publishers.
2. Advanced Engineering Mathematics by Lawrence Turyn, CRC Press.

Course Outcomes:

The student will be able to:

1. use Laplace transform techniques for solving de's.
2. evaluate integrals using beta and gamma functions.
3. evaluate the multiple integrals and can apply these concepts to find areas, volumes, moment of inertia etc of regions on a plane or in space.
4. Calculate the unit tangent vector, the unit normal vector and the unit binormal vector at a point on a space curve described by a vector-valued position function.
5. analyze the line, surface and volume integrals and converting them from one to another.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

(E120C) MATHEMATICS – III

(Common to CE,EEE,ME, ECE,CSE,IT,ECM& MIE)

Course Objectives:

The Student will

1. understand random variables that describe randomness or an uncertainty in certain realistic situation and binomial geometric and normal distributions.
2. formulate sampling distribution of mean, variance, point estimation and interval estimation and the testing of hypothesis and ANOVA.
3. describe the topics that deals with methods to find roots of an equation.
4. discuss how to fit a desired curve by the method of least squares for the given data.
5. identify how to solve ordinary differential equations using numerical techniques.

UNIT–I: Random variables and Distributions

Introduction, Random variables, Discrete random variable, Continuous random variable, Probability, Distribution function, Probability density function, Expectation, Moment generating function, Moments and properties. Discrete distributions: Binomial and geometric distributions. Continuous distribution: Normal distributions.

UNIT – II: Sampling Theory

Introduction, Population and samples, Sampling distribution of means (σKnown)-Central limit theorem, t-distribution, Sampling distribution of means (σunknown)-Sampling distribution of variances – $\chi^2$and F- distributions, Point Estimation, Maximum error of estimate, Interval estimation.

UNIT – III: Tests of Hypothesis

Introduction, Hypothesis, Null and Alternative Hypothesis, Type I andType II errors, Level of significance, One tail and two-tail tests, Tests concerning one mean and proportion, two means -proportions and their differences-ANOVA for one-way classified data.

UNIT – IV: Algebraic and Transcendental Equations & Curve Fitting

Introduction, Bisection Method, Method of False position, Iteration methods: fixed point iteration and Newton Raphson methods. Solving linear system of equations by Gauss-Jacobi and Gauss-Seidal Methods.

Curve Fitting: Fitting a linear, second degree, exponential, power curve by method of least squares.

UNIT – V: Numerical Integration and solution of Ordinary Differential equations

Trapezoidal rule-Simpson's 1/3rd and 3/8th rule- Solution of ordinary differential equations by Taylor's series, Picard's method of successive approximations, Euler's method, Runge-Kutta method (second and fourth order).

TEXT BOOKS:

1. Probability and Statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E. Freund, New Delhi, Prentice Hall.
2. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning.
3. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R.
4. K. Iyengar and R. K. Jain, New Age International Publishers.

REFERENCES:

1. Fundamentals of Mathematical Statistics by S. C. Guptha& V. K. Kapoor, S. Chand.
2. Introductory Methods of Numerical Analysis by S. S. Sastry, PHI Learning Pvt. Ltd.
3. Mathematics for engineers and scientists by Alan Jeffrey, 6th edition, CRC press.

Course Outcomes:

The student will be able to:

1. differentiate among random variables involved in the probability models which are useful for all branches of engineering.
2. evaluate mean, proportions and variances of sampling distributions and to make important decisions for few samples which are taken from a large data.
3. solve the tests of ANOVA for classified data.
4. identify the root of a given equation and solution of a system of equations & design a curve for a given data.
5. derive the numerical solutions for a given first order initial value problems.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

(E125A) COMPUTER PROGRAMMING IN C

(Common to EEE,ECE,CSE,IT&ECM)

Course Objectives:

The student will:

1. understand the fundamentals of computers.
2. reads the fundamentals of c programming such as variables, constants, basic data types, selection statements, repetition statements etc.
3. studies the need for user-defined functions and understand the concept of arrays and its memory organization.
4. reads the significance of pointers and describe about various character and string functions.
5. understand the concept of structures and unions.

UNIT - I:

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development, algorithms and flowcharts , Number systems-Binary, Decimal, Hexadecimal and Conversions, storing integers and real numbers.

Introduction to C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements(making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

UNIT - II:

Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Limitations of recursion, example C programs.

Arrays – Concepts, using arrays in C, inter function communication, array applications-linear search, binary search and bubble sort, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT - III:

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT - IV:

Enumerated, Structure ,and Union Types– The Type Definition (typedef), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command–line arguments, Preprocessor commands.

UNIT – V:

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions (fseek ,rewind and ftell), C program examples.

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A. Forouzan and R. F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Second Edition, Oxford University Press.

REFERENCES:

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, Second Edition, Pearson education.
2. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, McGraw Hill Education(India) Pvt Ltd.
3. C From Theory to Practice, G S. Tselikis and N D. Tselikas, CRC Press.

Course Outcomes:

The student will be able to:

1. demonstrate the basic knowledge of computer hardware and software.
2. write effective programs using c programming language.
3. choose between different argument passing mechanisms and use multidimensional arrays.
4. use pointers with arrays and apply various string functions.
5. differentiate between structures and unions.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**2**	**0-0-4**	**4**

(E123A) ENGINEERING DRAWING

(Common to EEE,ECE,CSE,IT&ECM)

Course Objectives:

The student will

1. understand basic knowledge of conventions used in engineering graphics, constructing engineering scales and various methods in getting engineering curves.
2. identify the different angles of projections, conventions and the position of objects in various planes.
3. distinguish the different orientations of two dimensional planes and right regular solids at different inclinations with respect to projection planes able to identify the internal features of object.
4. analyze the size and shape of required sheet to form a right regular solid.
5. solving the typical problems from 3-dimensional view to simplified 2-dimensional view and vice versa.

UNIT – I: INTRODUCTION TO ENGINEERING DRAWING

Principles of Engineering Drawing and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

CONSTRUCTION OF CURVES USED IN ENGINEERING PRACTICE:

a) Conic Sections, Ellipse- General, Concxentric Circle, Arcs of circle and Oblong Method

Parabola- General, Tangent and Rectangle Methods, Hyperabola-General, Point/Rectangle Method

b) Cycloid, Epicycloid and Hypocycloid

c) Involute for Circle, Rectangle and Triangle

UNIT – II: PROJECTIONS OF POINTS AND LINES

Principles of Orthographic Projections – Conventions – First and Third Angle, Projections of Points and Lines inclined to planes, True lengths, traces.

UNIT – III: PROJECTIONS OF PLANES

Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes.

UNIT –IV: PROJECTIONS OF SOLIDS

Projections of Regular Solids inclined to both planes – Auxiliary Views.

UNIT- V: ISOMETRIC PROJECTIONS

Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

ORTHOGRAPHIC PROJECTIONS: Conversion of Isometric Views to Orthographic Views – Conventions.

TEXT BOOKS :

1. Engineering Drawing, N.D. Bhat / Charotar.
2. Engineering Drawing and Graphics, Venugopal / New age.
3. Engineering Drawing – Basant Agrawal, TMH.

REFERENCES:

1. Engineering drawing – P.J. Shah.S.Chand.
2. Engineering Drawing, Narayana and Kannaiah / Scitech publishers.
3. Engineering Drawing- Johle/Tata Macgraw Hill.
4. Computer Aided Engineering Drawing- Trymbaka Murthy- I.K. International.

Course Outcomes:

The student will be able to:

1. identify the principals of engineering drawings.
2. examine visual aspects of engineering drawing and graphics.
3. draw the three dimensional objects.
4. demonstrate the ideas of engineering components in the form of a drawing.
5. design creative Engineering working drawings.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1201) ENGINEERING CHEMISTRY LAB

(Common to CE,EEE,ME,ECE,CSE,IT,ECM&MIE)

Course Objectives:

The student will

1. understand the importance of Chemical analysis in their daily life.
2. perform the different practical skills in conducting the lab experiments.
3. analyze the different results of the experiments when different external factors are being applied.
4. acquire experimental skills.
5. prepare more environment friendly engineering compounds at low cost.

Experiments:

1. Determination of Conc. of $KMnO_4$ by colorimetric method.
2. Estimation of copper by colorimetric method.
3. Conductometric titration of mixture of acids vs strong base.
4. Titration of strong acid vs strong base by potentiometry.
5. Determination of pH of the given solution.
6. Determination of viscosity of sample oil by redwood viscometer.
7. Preparation of Fe nanoparticles.
8. Estimation of hardness of water by EDTA method.
9. Estimation of manganese dioxide in pyrolusite.
10. Determination of Surface tension of lubricants.
11. Preparation of Aspirin.
12. Preparation of Thiokol rubber.

Note: Minimum 10 experiments must be performed.

Course Outcomes:

The student will be able to

1. identify the importance of chemical analysis in their daily life.
2. use different practical skills to analyse the results associated with the experiments build practical skills.
3. develop new environmental friendly and cost effective engineering compounds.
4. analyze the concepts of laboratory procedure.
5. determine the partition coefficient of a organic compound in two immissible liquid**s.**

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1202) ENGINEERING PHYSICS LAB

(Common to EEE, ECE,CSE,IT&ECM)

Course Objectives:

The student will:

1. works with uses of torsional pendulum
2. examine energy gap of semiconductors
3. analyze the behaviour and characteristics of various materials for its optimum utilization.
4. practice about the various electronic communication mechanisms and their usage in a practical manner.
5. demonstrate the ability to prepare a valid laboratory notebook.

Experiments:

1. Dispersive power of the material of a prism – Spectrometer.
2. Torsional pendulum – Rigidity modulus.
3. Newton's Rings – Radius of curvature of Plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Charging, discharging and time constant of an R-C circuit.
6. L-C-R circuit – Resonance & Q-factor.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method and to verify Biot –Savart's law.
8. Study the characteristics of LED and LASER diode.
9. Bending losses of fibres& Evaluation of numerical aperture of a given fibre.
10. Energy gap of a material of p-n junction.
11. Determination of wavelengths of white source – Diffraction grating.
12. Wavelength of light, resolving power and dispersive power of a diffraction grating using laser.
13. Dielectric constant of a material / V-I characteristics of a solar cell.

Note: Minimum 10 experiments must be performed.

Course Outcomes:

The student will be able to:

1. identify basic physical concepts and vocabulary used to describe them elasticity by using Torsional Pendulum.
2. apply the various procedures and techniques for the measurement of resonance frequency in LCR circuit.
3. analyze working principle of laser and to summarise it's applications.
4. explore the working principle of semiconductor diode.
5. identify the real time application of electromagnetic theory by stewart and gee's method.

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

(E1203) COMPUTER PROGRAMMING IN C LAB

(Common to EEE,ECE,CSE,IT & ECM)

Course Objective:

The student will :

1. implement linked list, stack , queue, tree.
2. develop programming skills using the fundamentals and basics of C language.
3. change character strings in C programs.
4. use pointers to efficiently solve problems.
5. memorize functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions.

Recommended Systems/Software Requirements:

- Intel based desktop PC
- GNU C Compiler

1. a) Write a C program to find the factorial of a positive integer.
   b) Write a C program to find the roots of a quadratic equation.
2. a) Write a C program to determine if the given number is a prime number or not.
   b)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 nterms of the sequence.
3. a) Write a C program to construct a pyramid of numbers.
   b) Write a C program to calculate the following Sum: $Sum=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
4. a) The least common multiple (lcm) of two positive integers a and b is the smallest integer that is evenly divisible by both a and b. Write a C program that reads two integers and calls lcm (a, b) function that takes two integer arguments and returns their lcm. The lcm (a, b) function should calculate the least common multiple by calling the gcd (a, b) function and using the following relation:CM (a,b) = ab / gcd (a,b)
   b) Write a C program that reads two integers n and r to compute the ncr value using the following relation: ncr (n,r) = n! / r! (n-r)! . Use a function for computing the factorial value of an integer.
5. a) Write C program that reads two integers x and n and calls a recursive function to compute xn
   b) Write a C program that uses a recursive function to solve the Towers of Hanoi problem.
   c) Write a C program that reads two integers and calls a recursive function to

compute ncr value.

6. a) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user using Sieve of Eratosthenes algorithm.
   b) Write a C program that uses non recursive function to search for a Key value in a given list of integers. Use linear search method.
7. a) Write a menu-driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
   b) Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers. Use binary search method.
8. a) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
   b) Write a C program that reads two matrices and uses functions to perform the following:
      i) Addition of two matrices
      ii) Multiplication of two matrices
9. a) Write a C program that uses functions to perform the following operations:
   i) to insert a sub-string into a 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 that uses a non recursive function to determine if the given string is a Palindrome or not.
10. a) Write a C program to replace a substring with another in a given line of text.
    b) Write a C program that reads 15 names each of up to 30 characters, stores them in an array, and uses an array of pointers to display them in ascending (ie. alphabetical) order.
11. a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
    b) Write a C program to convert a positive integer to a roman numeral. Ex. 11 is converted to XI.
12. **a)** Write a C program to display the contents of a file to standard output device.
    b) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
13. a) Writ**e a C** program to count the number of times a character occurs in a text file. The file name and the character are supplied as command-line arguments.
    b) Write a C program to compare two files, printing the first line where they differ.
14. a) Write a C program to change the nth character (byte) in a text file. Use fseek function.
    b) Write a C program to reverse the first n characters in a file. The file name and n are specified on the command line. Use fseek function.
15. a) Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

b) Define a macro that finds the maximum of two numbers. Write a C program that uses the macro and prints the maximum of two numbers.

REFERENCES:

1. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.
2. Computer Programming in C, V. Rajaraman, PHI.
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. C++: The complete reference, H. Schildt, TMH Publishers.

Course Outcomes

The student will be able to:

1. write, compile and debug programs using different programming constructs in C language.
2. design programs using modular structures
3. apply and practice logical ability to solve the problems using C
4. design and present the algorithms flow charts and programs
5. apply operations like searching, insertion, deletion, traversing mechanism etc. on various data structures

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B.Tech. ECE	**L**	**T-P-D**	**C**
I Year - II Semester	**2**	**0-0-0**	**0**

(E120E) ENVIRONMENTAL STUDIES
(Common to ECE, ECM, CSE,ME,MIE & IT)

Course Objectives:
The student will

1. discover about the different natural resources available and how to use them.
2. reads about biodiversity.
3. reads about environmental impact assessment and management.
4. studies about the global environmental problems.
5. studies about sustainability.

UNIT – I:

Ecosystems, Natural Resources& **Biodiversity:** concept, Classification of Resources: Water resources, Land resources, Forest resources, Mineral resources, Energy resources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, levels, hotspots, values of biodiversity, threats to biodiversity, conservation of biodiversity.

UNIT – II:

Global Environmental Problems And Global Efforts: Deforestation Green house effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols green-belt-development, Concept of Green Building, Clean Development Mechanism(CDM).

Environmental Impact Assessment (Eia) And Environmental Management Plan: definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP).

UNIT – III:

Environmental Policy, Legislation, Rules and Regulations & Towards Sustainable Future: Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

Text Books:

1. Text Book Of Environmental Science and Technology by M.Anji Reddy 2007.
2. Principles of Environmental Science and Engineering by P.Venugopal Rao.
3. Introduction to Environmental Studies by K.Mukkanti.
4. Text book of Envirtonmental Studies by Kaushik & Anubha Kaushik.

Reference Books:

1. Tata McgrawHill : Introduction to Environmental Studies by Benny Joseph.
2. Environmental studies by Erach Bharucha 2005, University Grants Commission, University Press.

Course Outcomes:

The student will be able to

1. learn the importance of natural resources and use them efficiently.
2. identify how to protect and conserve the biodiversity.
3. use environmental plan in developing any sort of environmental projects.
4. apply the environmental legislation in every walk of life.
5. explain importance of the natural resources for their future generations in a sustainable manner.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**4**	**0-0-0**	**4**

(E210B) COMPLEX ANALYSIS AND TRANSFORMS
(Common to ECE, EEE &ECM)

Course Objectives:

The Student will

1. define the maximum flow in a transport network and determine the corresponding mincut by designing an algorithm.
2. learn about lattices and complete partial orderings which are the correct frame work. for a study of denotational semantics of programming languages.
3. understand the solution of difference equations by using Z-transforms.
4. describe the differentiation of the complex functions.
5. describe the complex line integrals and use the residue theorem.

UNIT–I: Fourier series

Introduction-Euler's Formulae-Conditions foe Fourier Expansion-Functions having points of Discontinuity-change of interval-Odd and Even function.
Expansions of Odd or Even periodic functions-Half range series.

UNIT-II: Z-Transforms

Introduction-Definition-Some standard Z-Transforms-Linearity Property-Damping Rule-some standard result-Shifting u_n to the right and to the left Multiplication by n-Two basic theorems (Initial and Final).
Some useful Z-transforms-Some useful inverse Z-transforms-Convolution Theorem-Convergence of Z-Transforms-Two side Z-Transform-Evaluation of Z-Transforms-Applications to Difference Equations.

UNIT–III: Functions of a complex variable

Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann conditions. Maxima – Minima principle, Harmonic and conjugate harmonic functions – Milne – Thompson method.

UNIT–IV: Complex integration

Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.
Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

UNIT-V: Complex power series

Singular point –Isolated singular point – pole of order m – essential singularity. (Distinction between the real analyticity and complex analyticity).
Contour Integration Residue – Evaluation of residue by formula and by Laurent series -

Residue theorem, Evaluation of integrals of the type
(a) Improper real integrals ∫ f (x)dx (b) $\int_C$ f (cosx, sinx) dx

Text Books:

1. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
2. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons Publisher.
3. Graph Theory with Applications to Engineering and Computer science by Narsing Deo, Prentice Hall, Inc.

Reference Books:

1. Engineering Mathematics by N. P. Bali, Lakshmi Publications.
2. Advanced Engineering Mathematics by H.K.Dass, S.Chand Publications.

Course Outcomes:

The student will be able to:

1. Apply the knowledge in computer design. Identify whether a given function is differentiable and if so find its derivative and use differentiation rules to compute derivatives.
2. Show complex-differentiable functions as power series. Use anti derivatives to compute line integrals and Cauchy's integral theorem and formula to compute line integrals.
3. Evaluate complex line integrals and real integrals by residue theorem.
4. Relate the relationship between transform and the Fourier transform for discrete-time signals and the characteristics and properties of transform.
5. Evaluate transform and inverse transform and apply transform for analyzing linear time invariant (LTI) system.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**4**	**0-0-0**	**4**

(E214A) ANALOG ELECTRONICS
(COMMON TO ECE, ECM)

Course Objectives:

The Student will:

1. obtain ample knowledge in the analysis of single stage and multistage Amplifiers.
2. understand the constructional features of JFET & MOSFET and to analyze as amplifiers using small signal model.
3. gain the concept of feedback and to analyze the various feedback amplifiers.
4. know the concept of oscillators and to design the various oscillators useful for various application.
5. get ample knowledge in the analysis of large signal amplifiers and tuned amplifiers.

UNIT – I: ANALYSIS AND DESIGN OF SMALL SIGNAL BJT AMPLIFIERS

Analysis of CE, CC and CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier Different coupling schemes used in amplifiers.

Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, Frequency response of BJT amplifier. The Hybrid- pi Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product.

UNIT – II: FET AMPLIFIERS

Comparison of performance with BJT Amplifiers, Basic Concepts of MOS Amplifiers, and MOSFET Characteristics in Enhancement and Depletion mode.

MOS Small signal model, Common source amplifier with resistive load, Source follower-frequency response.

UNIT – III: NEGATIVE FEEDBACK IN AMPLIFIERS

Classification of amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers – Effect of Feedback on Amplifier characteristics.

Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

UNIT- IV: POSITIVE FEEDBACK IN AMPLIFIERS

Condition for oscillations, RC and LC type Oscillators – Frequency and amplitude stability of oscillators.

Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators – RC-phase shift and Wien-bridge oscillators.

UNIT – V: LARGE SIGNAL AMPLIFIERS

Class A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Push Pull and Complimentary Symmetry Class B and Class AB Power Amplifiers.

Principle of operation of class –C Amplifier, Transistor Power Dissipation, Heat Sinks, Introduction to Tuned Amplifiers, Q-Factor, Small Signal Tuned Amplifiers.

TEXT BOOKS:

1. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
2. Electronic Devices and Circuits – 2nd Edition by Muhammad H.Rashid, Cengage Learning.

REFERENCES:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH.
2. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
3. Microelectronic Circuits – Sedra / Smith – 5th Edition – Oxford, 2009 .
4. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.
5. Electronic Devices and Circuits, Anil.K. Maini, Varsha Agrawal, 1st Edition, WILEY.
6. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson Education.

Course Outcomes: The Student will be able to:

1 analyze the single stage and multistage amplifiers.
2 analyze the JFET & MOSFET amplifiers using small signal model.
3 demonstrate the concept of feedback amplifiers.
4 illustrate various types of oscillators.
5 interpret large signal amplifiers and tuned amplifiers.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**4**	**1-0-0**	**4**

(E212D) ELECTRICAL TECHNOLOGY

Course Objectives:

The Student will:

1. analyze transient response of circuits with DC excitation.
2. understand two port network parameters.
3. design of different types of filters and attenuators.
4. know about performance of DC Machines.
5. understand the operation of transformers and AC Machines.

Unit – I – **Transient Analysis:** (First and Second Order Circuits) Transient Response of RL , RC Series, RLC Circuits for DC excitations.

Initial Conditions, Solution using Differential Equations approach and Laplace Transform Method.

Unit – II – **Two Port Networks:** Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission (ABCD) Parameters, Conversion of one Parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations, Image Parameters, Illustrative problems.

Unit – III – **Filters:** Classification of Filters, Filter Networks, Classification of Pass band and Stop band, Characteristic Impedance in the Pass and Stop Bands, Constant-k Low Pass Filter, High Pass Filter, m-derived T-Section, Band Pass filter and Band Elimination filter, Illustrative Problems.

Symmetrical Attenuators: Symmetrical Attenuators – T-Type Attenuator, π–Type Attenuator, Bridged T type Attenuator, Lattice Attenuator.

Unit –IV – **DC Machines:** Principle of Operation of DC Machines, EMF equation, Types of Generators, Magnetization and Load Characteristics of DC Generators.

DC Motors DC Motors, Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test, Speed Control of DC Shunt Motor, Flux and Armature Voltage control methods.

Unit –V –**AC Machines:** Principle of Operation of Single Phase transformer, Types, Constructional Features, Phasor Diagram on No Load and Load, Equivalent Circuit, Losses and Efficiency of Transformer and Regulation, OC and SC Tests , Predetermination of Efficiency and Regulation, Load test on 1 phase transformer, determination of efficiency(Simple Problems).

Single Phase Induction Motors Principle of Operation, Shaded Pole motors, Capacitor motors, AC Servomotor, AC Tachometers, Synchros, Stepper Motors, Characteristics.

Text Books :

1. Fundamentals of Electric Circuits – Charles K. Alexander, Mathew N. O. Sadiku, 3 ed., 2008, TMH.
2. Network Analysis – A Sudhakar ,Shyammohan S.Palli, 3 ed., 2009, TMH.
3. Introduction to Electrical Engineering – M.S.Naidu and S. Kamakshaiah, 2008,

TMH.

Reference Books :

1. Networks, Lines and Fields – John.D.Ryder, 2 ed., 2008 (Reprint), PHI.
2. Engineering Circuit Analysis - W.H.Hayt and J. E Kemmerly and S.M.Durbin, 6 ed., 2008, TMH.
3. Network analysis and Synthesis – C L Wadhwa, 3 ed., 2007, New Age International Publishers.

Course Outcomes:

The Student will be able to:

1. analyze transient response of circuits.
2. evaluate two port parameters.
3. design of filters.
4. appreciate the working of DC Machines.
5. asses the operation of transformers and AC Machines.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**3**

(E214B) SIGNALS AND SYSTEMS

Course Objectives:

The student will

1. understand various continuous time signals and systems.
2. emphasis on the concept and methods those are necessary for analysis of continuous time signals and systems.
3. gain more familiarity with different types of transformation and their properties.
4. study of Fourier Transform, Laplace Transform and Z-Transform.
5. get Additional insight of sampling technique into various applications of signals and systems in different fields.

Unit I: Signal Analysis

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

Fourier Analysis: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum, Deriving Fourier Transform from Fourier Series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

Unit II: Signal Transmission through Linear Systems

Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems.

Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time.

Unit III: Convolution and Correlation of Signals

Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

IV: Sampling and Laplace Transforms

Sampling theorem – Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Review of Laplace Transforms (L.T), Partial fraction expansion, Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various classes of signals, Properties of L.T, Relation between L.T and F.T of a signal.

Unit V: Z–Transforms

Fundamental difference between Continuous and Discrete time signals, Discrete time signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal.

Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

Text Books:

1. Signals, Systems & Communications - B.P. Lathi, 2009, BSP.
2. Signals and Systems – A. Rama Krishna Rao – 2008, TMH.

Reference Books:

1. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 ed., PHI.
3. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd edition.

Course Outcomes:

The student will be able to

1. analyze the properties of Continues and Discrete signals and systems with their frequency response.
2. solve the impulse response, step response and frequency response of both continuous-time and discrete-time systems.
3. apply operations such as convolution, correlation, signal shifting on basic signals.
4. implement the concept of sampling technique in different communication applications.
5. determine the convolution and correlation between signal and Sequences.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**3**

(E214F) PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Objectives:

The Students will

1. read, write and understand sentences in the language of probability theory, as well as solve probabilistic problems in signal processing and Communication Engineering.
2. understand basic concepts of probability theory and random variables, how to deal with multiple random variables, Conditional probability and conditional expectation, joint distribution and independence, mean square estimation.
3. analyze concepts of transformation of random variables.
4. analyze random process and application to the signal processing in the communication system.
5. apply sums and integrals to compute probabilities, means, and expectations.

Unit I: Introduction to Probability and Random Variable

Probability introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions and their Properties - Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and Conditional Distribution, Methods of defining Conditional Event, Conditional Density, Properties.

Unit II: Operation on Random Variable – Expectations

Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Variance and Skew, Joint Moments about the Origin, Central Moments, Joint Central Moments.

Chebychev's Inequality, Characteristic Function, Joint Characteristic Functions, Moment Generating Function, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties.

Unit III: Transformations of Random Variables

Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable, Statistical Independence.

Sum of Two Random Variables, Sum of Several Random Variables, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables,

Central Limit Theorem (Proof not expected), Unequal Distribution, Equal Distributions.

Unit IV: Stochastic Processes – Temporal Characteristics

The Stochastic Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationary and Statistical Independence, First-Order Stationary Processes, Second-Order and Wide-Sense Stationary, N^{th} Order and Strict-Sense Stationary.

Time Averages and Ergodic, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance and its Properties, Linear System Response: Mean and Mean-squared Value, Autocorrelation Function, Cross-Correlation Functions of Linear System Response, Gaussian Random Processes, Poisson Random Process**.**

Unit V: Stochastic Processes - Spectral Characteristics and Noise

Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Spectral Density of Input and Output of a Linear System.

Types of Noise: Resistive (Thermal) Noise Source, Shot noise, Extra terrestrial Noise, Arbitrary Noise Sources, White Noise, Narrowband Noise: In phase and quadrature phase components and its Properties, Modeling of Noise Sources, Average Noise Bandwidth, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

TEXT BOOKS

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, 4 ed., 2001, TMH.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, 4 ed., TMH.

REFERENCES

1. Theory of Probability and Stochastic Processes- Pradip Kumar Gosh, University Press.
2. Probability Theory and Stochastic Processes- Mallikarjuna Reddy, Cengage Learning.
3. Principles of Communication systems – H.Taub, Donald.L.Schilling, Goutam Saha, 3 ed., 2007, TMH.

Course Outcomes:

The student will able be to

1. develop the mathematical techniques relating to theory and applications of probability and stochastic process.
2. find mean square value of the response of any LTI system and transformation.
3. estimate the power spectral density of the response of any LTI system.
4. examine different types of noise sources around the environment.
5. analyze different types of characteristics of PDF.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**2**

(E2111) BASIC ELECTRONICS LAB
(COMMON FOR ECE, EEE, ECM)

Course Objectives:

The Students will

1. study basic electronic components.
2. observe characteristics of electronic devices.
3. gain practical knowledge of BJT's, JFET's.
4. study the operation of multimeters.
5. understand the characteristics of rectifiers, zener diode and transistors.

PART A: (Only for Viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions) :

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
    a. Multimeters (Analog and Digital)
    b. Function Generator
    c. Regulated Power Supplies
    d. CRO

PART B: (For Laboratory Examination – Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration.
4. Input & Output Characteristics of Transistor in CE Configuration.
5. Half Wave Rectifier with and without filters.
6. Full Wave Rectifier with and without filters.
7. FET characteristics.
8. Measurement of h parameters of transistor in CB, CE, CC configurations.
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier.
12. SCR characteristics.
13. UJT Characteristics.

Course Outcomes:

The student will be able to

1. measure voltage, frequency and phase of any waveform using CRO.
2. synthesise sine, square and triangular waveforms with required frequency and amplitude using function generator.
3. explain the characteristics of different electronic devices such as diodes, transistors.
4. analyze the characteristics of circuits like rectifiers, amplifiers.
5. sketch the characteristics of SCR and UJT.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**2**

(E2112) BASIC SIMULATION LAB

Course Objectives:

The Student will

1. gain fundamentals of MATLAB tool for the analysis and processing of signals and to generate various continuous and discrete time signals.
2. determine the Fourier Transform of signals and to convert a continuous time signal to the discrete time and reconstruction using the sampling theorem.
3. gain the knowledge about continuous time LTI/LTV systems using convolution.
4. use Laplace and Z-transforms for analyzing Continuous/ Discrete time signals and systems.
5. gain practical knowledge on basic simulation process.

List of Programmes:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution between Signals and sequences.
6. Auto Correlation and Cross Correlation between Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.

12. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
13. Sampling Theorem Verification.
14. Removal of noise by Autocorrelation / Cross correlation.
15. Extraction of Periodic Signal masked by noise using Correlation.
16. Verification of Weiner-Khinchine Relations.
17. Checking a Random Process for Stationarity in Wide sense.

SOFTWARE REQUIRED: MATLAB/OCTAVE

Course Outcomes:

The student will be able to

1. analyze the generation of Various Signals and Sequences in MATLAB, including the
2. analyze the operations on Signals and Sequences.
3. determine the Convolution and Correlation between Signals and sequences.
4. verify the Linearity, Time Invariance and Stability Properties of a given Continuous/Discrete System.
5. analyze the Waveform Synthesis using Fourier, Laplace and Z-Transform.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**2**

(E2113) ELECTRICAL TECHNOLOGY LAB

Course Objectives:

The Student will

1. be acquaint with the basic concepts and properties of electrical circuits and networks; and provide hands on experience to the students so that they are able to put theoretical concepts to practice.
2. understand the concept of circuit laws Solve the electrical network using mesh and nodal analysis by applying network theorems.
3. conduct testing and experimental procedures on different types of electrical machines.
4. practice different types of wiring and devices connections.
5. analyze the operation of electric machines under different loading conditions.

PART – A

1. Serial and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.

2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.

3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.

4. Verification of Superposition and Reciprocity theorems.

5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.

6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

PART – B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.

2. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).

3. Brake test on DC shunt motor. Determination of performance characteristics.

4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).

5. Brake test on 3-phase Induction motor (performance characteristics).

6. Regulation of alternator by synchronous impedance method.

Note: Any TEN of the above experiments are to be conducted

Course Outcomes:

The Student will be able to

1. acquire knowledge and skills about electric instruments, such as millimeters, oscilloscope. Identify and learn properties about main electrical components, such as resistors, capacitors, inductors, voltage source, AC power sources and service equipment, transformers.
2. explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
3. acquire team work skills for working effectively in groups.
4. Choose suitable measuring instrument for a given application.
5. analyze the response of any electrical machine.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - I Semester	**0**	**0-3-0**	**0**

(E2114) GENDER SENSITIZATION

(Common to all branches)

Course Objectives:

The student will

1. understand Caste System.
2. learn women's work its politics and economics.
3. become aware rebuilding lives.
4. understand about relationships.
5. understand responsibilities and gender identities.

Unit-I – Gender: Why should we study it?, Socialization: Making women, Making Men, Introduction, Preparing For Womanhood, Growing up male, First lessons in caste, Different masculinities.

Unit-II- Women's Work: Its Politics and Economics,

Fact and fiction, Unrecognized and unaccounted work, Further reading: Wages and conditions of work, Domestic Violence: Speaking Out, Is home a safe place?, When women unite [Film], Rebuilding lives, Further reading: New forums for justice.

Unit-III–Just Relationships: Being Together as Equals,

Mary kom and Onler, Love and acid just do not mix, Love letters, Mothers and fathers, Further Reading: Rosa Parks – The brave heart.

Text Books:

1. Towards a world of equals by A. Suneetha Susic Tharu publication Telugu academy Hyderabad.

Course Outcomes:

The student will be able to

1. describe the need of study gender sensitization.
2. come out of ignorance and archaic indoctrination to make the world a better place for both men and women.
3. have learnt to keep themselves safe and alive in the face of domestic violence.
4. learnt to maintain equality in gender. The student should have understood the responsibility of being good.
5. describes the basic structure of Caste system in India and the major four categories to which all castes belong.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**4**	**0-0-0**	**4**

(E224A) SWITCHING THEORY AND LOGIC DESIGN

Course Objectives:

The student will

1. understand basic number systems codes and logic gates.
2. understand the concepts of Boolean algebra.
3. implement simple logical operations using combinational logic circuits
4. understand combinational logic circuits, sequential logic circuits.
5. learn the concepts of state reduction methods for sequential circuit and implement synchronous state machines using flip-flops.

UNIT I

Number Systems & Codes: Philosophy of Number Systems, Complement Representation of Negative Numbers.

Binary Arithmetic, Binary Codes, Error Detecting & Error Correcting Codes, Hamming codes.

UNIT II

Boolean Algebra and Switching Functions : Fundamental Postulates of Boolean Algebra, Basic theorems and Properties, Switching Functions, Canonical and Standard forms, Algebraic simplification Digital Logic Gate

Properties of XOR gates, Universal Gates, Multilevel NAND/NOR Realizations. **Minimization of Switching Functions**: Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, Simplification rules.

UNIT III

Combinational Logic Design

Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and Hazard free Realizations.

Programmable Logic Devices & Threshold Logic: Basic PLD's-ROM, PROM, PLA, PAL, Realization of Switching functions using PLD's, Capabilities and Limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

UNIT IV

Sequential Circuits - I : Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic Flip-Flops, Triggering and Excitation tables, Steps in Synchronous Sequential Circuit Design, Design of modulo-N Ring & Shift counters, Serial binary adder, Sequence detector.

Sequential Circuits - II : Finite State Machine-Capabilities and Limitations, Mealy and Moore models, Minimization of Completely Specified and Incompletely Specified Sequential Machines, Partition Techniques and Merger chart methods, Concept of Minimal cover table.

UNIT V

Algorithmic State Machines: Salient features of the ASM chart, Simple examples, System design using data path and control subsystems.

Control implementations, Examples of Weighing Machine and Binary multiplier.

TEXTBOOKS:

1. Switching & Finite Automata theory – Zvi Kohavi, 2 ed., TMH.
2. Digital Design – Morris Mano, 3 ed., 2006, PHI.

REFERENCES BOOKS:

1. Switching Theory and Logic Design – A. Anand Kumar, 2008, PHI.
2. An Engineering Approach to Digital Design – Fletcher, PHI.
3. Fundamentals of Logic Design – Charles H. Roth, 5 ed., 2004, Thomson Publications.

Course Outcomes:

The student will be able to

1. analyse number systems and codes.
2. solve Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
3. design and analyze combinational circuits and to use standard combinational functions/building blocks to build more complex circuits.
4. design and analyze sequential circuits and apply state reduction methods to solve sequential circuits.
5. solve various problems using Algorithmic state machines.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**4**	**0-0-0**	**4**

(E224B) PULSE AND DIGITAL CIRCUITS

Course Objectives:
The Student will

1. study the characteristics of Linear and Non-Linear wave shaping circuits.
2. compare different types of Comparators. study the switching characteristics of a transistor.
3. design of various multivibrators.
4. design of boot strap, miller sweep circuit.
5. response of uni directional and bi-directional sampling gates and study of Logic gates.

Unit-I

Linear Wave Shaping: High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator, Attenuators and its application as a CRO Probe, RL and RLC Circuits and their response for Step Input, Ringing Circuit.

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, Clipping at two independent levels, Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, Effect of diode characteristics on clamping voltage.

Unit-II

Switching Characteristics of Devices : Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Break down voltages, Transistor in Saturation, Transistor-switching times.

Multivibrators: Analysis and Design of Bitable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Unit-III

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, Miller and Bootstrap Time base Generators-Basic Principles, Transistor Miller.

Time Base generator, UJT as relaxation oscillator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators, Methods of Linearity improvement.

Unit-IV

Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices,

Frequency division in Sweep Circuit, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits.

Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and modulation.

Unit-V

Sampling Gates: Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits, Six Diode Gate, Application of Sampling Gates.

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison.

Text Books:

1. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub., 2 ed., 2008, TMH.
2. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 ed., 2008, TMH.

References Books:

1. Pulse and Digital Circuits – A. Anand Kumar, 2005, PHI.
2. Fundamentals of Pulse and Digital Circuits- Ronald J. Tocci, 3 ed., 2008.
3. Pulse and Digital Circuits – Motheki S. Prakash Rao, 2006, TMH.

Course Outcomes:

The Student will be able to

1. analyze the characteristics of Linear and Non-Linear wave shaping.
2. compare different types of Comparators. Analyze the switching characteristics of a Transistor.
3. design various multivibrators.
4. design Boot Strap ,Miller Sweep Circuit.
5. determine the response of Unidirectional and Bi-Directional Sampling gates and realize different Logic Gates.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**4**	**1-0-0**	**4**

(E224C) CONTROL SYSTEMS

Course Objectives:
The Student will

1. learn the fundamental concepts of Control Systems and Mathematical modeling of the System.
2. learn the behavior of the Control Systems in Time and Frequency domain.
3. understand the Stability of Control Systems using Root Locus, Bode plots and Nyquist Techniques.
4. recognize different Compensators.
5. study of Controllers in Time and Frequency domain.

UNIT – I INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences-Different examples of control systems-Classification of control systems, Feed-Back Characteristics, Effects of feedback.
Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems.

UNIT II: TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason‘s gain formula.

TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT III: STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh‘s stability criterion – qualitative stability and conditional stability – limitations of Routh‘s stability.
Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT-IV: **FREQUENCY RESPONSE ANALYSIS AND STABILITY ANALYSIS IN FREQUENCY DOMAIN**

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram.

Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots-Nyquist Plots-Stability Analysis.

UNIT-V: CLASSICAL CONTROL DESIGN TECHNIQUES AND STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers. Concepts of state, state variables and state model, derivation of state models from block diagrams.

Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Automatic Control Systems 7th edition– by B. C. Kuo 2009– PHI/Jhon wiley, 8 ed.
2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

REFERENCES BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by Anand Kumar,PHI 2008.
3. Control Systems Engg. by NISE 5th Edition – John wiley.

Course Outcomes:

The Student will be able to

1. describe and simplify a Control Systems using block diagram and Signal flow graph technique.
2. analyze the transient and steady state performance of Control System.
3. investigate the Stability of a system using Time domain techniques.
4. investigate the Stability of a system using Frequency domain techniques.
5. apply different Compensators and Controllers in Time and Frequency.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**1-0-0**	**3**

(E224D) ANALOG COMMUNICATIONS

Course Objectives:
The student will

1. analyze system requirements of analog communication systems. understand the need for modulation.
2. understand the generation, detection of various analog modulation techniques and also perform the mathematical analysis associated with these techniques.
3. acquire knowledge to analyze the noise performance of analog modulation techniques.
4. acquire theoretical knowledge of each block in AM and FM receivers.
5. understand the pulse modulation techniques.

UNIT-I: Introduction to communication system, Need for modulation, Amplitude Modulation, Definition, Time domain and frequency domain description, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.
DSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT-II: **SSB MODULATION:** Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves,
Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT-III: ANGLEMODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Comparison of FM & AM.
Generation of FM Waves: Direct Method: Parametric Variation Method: Varactor Diode, Reactance Modulator, indirect Method: Armstrong Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Foster Seeley Discriminator, Ratio detector.

UNIT-IV: TRANSMITTERS and RECEIVERS: Radio Transmitters-Classification of Transmitters, AM transmitter block diagram and explanation of each block. FM transmitter block diagram and explanation of each block.
Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC
FM Receiver, Comparison with AM Receiver, Amplitude limiting.

UNIT-V: NOISE : Noise in Analog communication System, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.
PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity)
PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM.

TEXTBOOKS:

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.

REFERENCES BOOKS:

1. Electronic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Principles of Communication Systems - H Taub & D. Schilling, Gautam Sahe, TMH, 2007, 3rd Edition.

Course Outcomes:
The student will be able to

1. analyze and design various modulation and demodulation of analog systems.
2. analyze the characteristics of noise present in analog systems.
3. solve Signal to Noise Ratio (SNR) performance of various Analog Communication systems.
4. design the various Pulse Modulation Systems.
5. design low power AM and FM transmitters.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**1-0-0**	**3**

(E224E) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Course Objectives:

The student will

1. obtain knowledge on vector analysis and electro static fields.
2. obtain knowledge on Magnetic fields.
3. get knowledge on the concept of Maxwells Equations.
4. have knowledge on the concept of uniform plane waves.
5. study various types of Transmission lines.

UNIT I

Electrostatics – I : Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V.

Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems.

Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation. Poisson's and Laplace equations, parallel plate capacitance.

UNIT II

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields.

Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

UNIT III

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density.

Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT IV

EM Wave Characteristics : Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Wave Propagation in Lossless and Conducting Media.

Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, polarization, Poynting Vector and Poynting Theorem, Illustrative Problems.

UNIT V

Transmission Line : Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading, Illustrative Problems.

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements: $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations, Significance of Z_{min} and Z_{max} Smith Chart – Configuration and Applications, Single and Double Stub Matching, Illustrative Problems.

TEXT BOOKS :

1. Elements of Electromagnetics – Matthew N.O. Sadiku, 4 ed., 2008, Oxford Univ.Press.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, 2 ed., 2000, PHI.

REFERENCES Books:

1. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan, 2001, (Tech. India Publications), New Delhi.
2. Engineering Electromagnetic – Nathan Ida, 2 ed., 2005, Springer (India) Pvt. Ltd., New Delhi.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 7 ed., 2006, TMH.

Course Outcomes:

The student will be able to

1. develop the mathematical equations and analyze for electric field intensities for various charge distributions.
2. solve mathematical equations and analyze for magnetic field intensities for various current elements.
3. analyze the concept of Maxwell's equations for time varying situations.
4. illustrate the concept of wave characteristics and uniform plane waves.
5. analyze the various types of transmissions lines.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2212) ANALOG COMMUNICATIONS LAB

Course Objectives:

The student will

1. understand different modulation techniques like AM, FM, DSBSC,SSB.
2. study of spectrum analyzer and analysis of AM&FM signals.
3. understand the concepts of Mixer & AGC.
4. study of various Pulse Modulation Systems.
5. gain practical knowledge of analyzing AGC characteristics.

Note: Minimum 12 experiments should be conducted:

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector.
3. SSB-Sc Modulator & Detector (Phase Shift Method).
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals.
6. Pre-emphasis & de-emphasis.
7. Characteristics of Mixer.
8. Verification of Sampling Theorem.
9. Pulse Amplitude Modulation & Demodulation.
10. Pulse Width Modulation & Demodulation .
11. Pulse Position Modulation & Demodulation.
12. Frequency Synthesizer.
13. AGC Characteristics.
14. PLL as FM Demodulator.

Equipment required for Laboratories:

1. RPS - 0 – 30V
2. CRO - 0 – 20 MHz.
3. Function Generators - 0 – 1 MHz
4. RF Generators - 0 – 1000 M Hz./0 – 100 MHz.
5. Multimeters
6. Lab Experimental kits for Analog Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.
9. Spectrum Analyzer - 60 M Hz.
10. Any one simulation package.

Course Outcomes:

The student will be able to

1. describe different modulation techniques like AM, FM, DSBSC, SSB.
2. analyze spectral characteristics of AM&FM signals.
3. explain the concepts of Mixer & AGC.
4. design and analyze various Pulse Modulation Systems.
5. evaluate AGC characteristics and have knowledge of frequency synthesizer.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2213) PULSE AND DIGITAL CIRCUITS LAB

Course Objectives:

The student will

1. understand the characteristics of Linear and Non-Linear wave shaping.
2. know the switching characteristics of a Transistor.
3. get the working principles of various Multivibrators.
4. understand Boot Strap ,Miller Sweep Circuit.
5. differentiate Uni Directional and Bi-Directional Sampling gates.
6. understand the operations of Logic Gates.

Minimum Twelve experiments to be conducted:

1. Linear wave shaping-Low Pass circuit.
2. Linear Wave shaping-High Pass circuit.
3. Non Linear wave shaping – Clippers.
4. Non Linear wave shaping – Clampers.
5. Transistor as a switch.
6. Study of Logic Gates & some applications.
7. Study of Flip-Flops & some applications.
8. Sampling Gates.
9. Astable Multivibrator.
10. Monostable Multivibrator.
11. Bistable Multivibrator.
12. Schmitt Trigger.

13. UJT Relaxation Oscillator.

14. Bootstrap Sweep Circuit.

Course Outcomes:

The student will be able to

1. explain the characteristics of Linear and Non-Linear wave shaping.
2. analyze the switching characteristics of a Transistor.
3. design various Multivibrators.
4. design Boot Strap ,Miller Sweep Circuit.
5. examine Uni Directional and Bi-Directional Sampling gates.

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B.Tech. ECE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

(E2214) ANALOG ELECTRONICS LAB

Course Objectives:

The student will

1. provide with basic knowledge of trainer kits and equipment.
2. train with a analog integrated circuit design.
3. work with different design tools.
4. gain knowledge of transistor kits operation.
5. understand the function of simulation software.

List of Experiments (Twelve experiments to be done):

Design (any six) and Simulation (any Ten) using Multisim or Pspice or Equivalent Simulation Software:

PART-A

1. Common Emitter Amplifier.
2. Common Source amplifier.
3. Class B Complementary Symmetry Amplifier.
4. Current Shunt and Voltage Series Feedback Amplifier.
5. Cascade Amplifier.
6. Single Tuned Voltage Amplifier.

PART-B

7. Wien Bridge Oscillator using Transistors.
8. RC Phase Shift Oscillator using Transistors.
9. Class A Power Amplifier (Transformer less).
10. Two Stage RC Coupled Amplifier.
11. Hartley and Colpitt's Oscillator.

Equipments required for Laboratories:

1. For software simulation of Electronic circuits:
   a) a. Computer Systems with latest specifications
   b) b. Connected in LAN (Optional)
   c) c. Operating system (Windows XP)

d) d. Simulations software (Multisim / TINAPRO) Package.

2. For Hardware simulations of Electronic Circuits
    a. RPSs
    b. CROs
    c. Functions Generators
    d. Multimeters
    e. Components

Course Outcomes:

The student will be able to

1. practice with trainer kits, C.R.O. & components.
2. analyze an Op-Amp configurations & applications.
3. simulate various Op-Amp circuits using Multisim-8 design environment tool.
4. analyze an Op-Amp configurations & applications.
5. validate various hardware components and simulation software.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E314A) Antenna and Wave Propagation

Course Objectives:

The student will

1. be introduced to basic concepts antennas and their operation.
2. attain knowledge on the basic parameters considered in the design process and analysis while designing the antenna.
3. study the varies antenna measurement .
4. study performance analysis of standard antennas and their applications.
5. understand the concept of radio wave propagation in the vicinity of earth through troposphere and ionosphere.

Unit I: Antenna Basics: Introduction, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height, Antenna Temperature, Front - to-back Ratio, Radiation Resistance , Illustrative Problems.

Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height ,Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths,

Unit II: Loop Antennas - Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small and Large Loops (Qualitative Treatment).

Antenna Arrays: Point Sources – Definition, Patterns**,** arrays of 2 Isotropic Sources **-** Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.

Unit III: VHF, UHF and Microwave Antennas - I : Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas –Types, Fermat_s Principle, Optimum Horns, Design Considerations of Pyramidal Horns.

VHF, UHF and Microwave Antennas - II: Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Impact of Different Parameters on Characteristics, Reflector Antennas – Introduction, Flar Sheet and Corner Reflectors, Paraboloidal Reflectors– Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features.

Unit IV: Reflector Antennas – Introduction, Flar Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features.

Lens Antennas – Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods).

Unit V: Wave Propagation – I: Introduction, Definitions, Classifications, Different Modes of Wave Propagation. Ground Wave Propagation, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption. Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation, Fading and Path Loss Calculations.

Wave Propagation – II: Sky Wave Propagation Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Hight and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation, Energy Loss in Ionosphere.

Text Books:

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, TMH, New Delhi, 4th ed., 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

References:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Antennas –John D. Kraus, McGraw-Hill (International Edition), 2nd ed. 1988.

Course Outcomes:

The student will be able to

1. review various antenna parameters.
2. obtain mathematical and physical concepts of antennas.
3. distinguish various techniques in antenna array formation.
4. illustrate the directional behaviour of arrays.
5. analyse the key factors in different wave propagation techniques.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**0-0-0**	**4**

(E314B) LINEAR AND DIGITAL IC APPLICATIONS

Course Objectives:

The Student will

1. understand the basic building blocks of linear and digital integrated circuits.
2. familiarize with op-amp applications of active filters and oscillators.
3. gain the theory about applications of analog multipliers and PLL.
4. demonstrate the working of ADC and DAC.
5. apply the knowledge of digital integrated circuits in the applications of TTL-74XX Circuits .

PART 1: LINEAR INTEGRATED CIRCUITS

UNIT I: INTEGRATED CIRCUITS

Classification, Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-amp characteristics-DC and AC Characteristics, 741 Op-Amp and its Features, Concept of Virtual Ground ,Modes of operation-inverting, non-inverting, differential.

OP-AMP APPLICATIONS

Basic Applications of Op-Amp, Instrumentation Amplifier, AC Amplifier, V to I and I to V Converters, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger, Multivibrators.

UNIT II: ACTIVE FILTERS & OSCILLATORS

Introduction, First Order and Second Order Low Pass, High Pass and Band Pass Filters, Active Band Reject and All Pass Filters.

Principle of Operation and Types of Oscillators – RC, Wien Bridge and quadrature type. Waveform Generators – Triangular, Saw Tooth, Square Wave.

UNIT III: TIMERS & PHASE LOCKED LOOPS

Introduction to 555 Timer, Functional Diagram, Monostable and Astable Operations and Applications, Schmitt Trigger, PLL - Introduction, Block Schematic, Principles and Description of Individual Blocks of 565, VCO. Introduction to Voltage Regulators, Features of 723 Regulator.

D-A AND A- D CONVERTERS

Introduction, Basic DAC Techniques - Weighted Resistor Type, R-2R Ladder Type, Inverted R-2R Type. Different types of ADCs – Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type. DAC and ADC Specifications.

PART 2: DIGITAL INTEGRATED CIRCUITS

UNIT IV: Logic Families

Classification of Integrated Circuits, Standard TTL NAND Gate- Analysis & Characteristics, TTL Open Collector Outputs, Tristate TTL.

MOS & CMOS open drain and tristate outputs, Comparison of Various Logic Families, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT V: COMBINATIONAL CIRCUIT ICs

Use of TTL-74XX Series ICs, - Code Converters, Decoders, Demultiplexers, Encoders, Priority Encoders, multiplexers & their applications, Priority Generators, Arithmetic Circuit ICs-Parallel Binary Adder/Subtractor Using 2's Complement System, Magnitude Comparator Circuits.

SEQUENTIAL CIRCUIT ICs

Commonly Available 74XX– RS, JK, JK Master-Slave, D and T Type Flip-Flops & their Conversions, Synchronous and asynchronous counters, Decade counters, Shift Registers & applications.

TEXT BOOKS:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 3rd Ed., 2008.
2. Digital Fundamentals – Floyd and Jain, Pearson Education,8th Edition, 2005.
3. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.

REFERENCES:

1. Modern Digital Electronics – RP Jain – 4/e – TMH, 2010.
2. Op-Amps and Linear Integrated Circuits – Concepts and Applications by James M.Fiore, Cengage/ Jaico, 2/e, 2009.
3. Operational Amplifiers and Liner Integrated Circuits by K.Lal Kishore – Pearson, 2008.
4. Operational Amplifiers with Linear Integrated Circuits, 4/e William D.stanley, Pearson Education India, 2009.

Course Outcomes:

The Student will be able to:

1. describe operational amplifiers with linear and digital integrated circuits.
2. design op amp as active filters and oscillators.
3. reconstruct and relate circuits using operational amplifiers for various applications.
4. examine OP Amp to work as a converters.
5. illustrate special function integrated circuits.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

(E314C) DIGITAL COMMUNICATIONS

Course Objectives:

The Student will

1. acquire the knowledge about fundamental blocks of digital communication system.
2. identify the mathematical pre-requisites for communications systems and signal analysis.
3. Represent a digital signal using Different modulation methods
4. analyze error performance of a digital communication system in presence of noise and other interferences.
5. understand concept of spread spectrum communication system.

Unit-I: Elements of Digital Communication Systems

Model of Digital Communication Systems, Digital Representation of Analog Signal, Certain issues in Digital Transmission. Advantages of Digital Communication Systems, Bandwidth-S/N tradeoff, Hartley Shanon Law, Sampling Theorem.

Unit-II: Pulse Code Modulation

PCM Generation and Reconstruction, Quantization noise, Non uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

Digital Modulation Techniques: Introduction, ASK,ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum of FSK, Non coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL, BPSK, Coherent PSK Detection, QPSK, Differential PSK.

Unit-III: Baseband transmission and Optimal Reception of Digital Signal

Pulse shaping for optimum transmissions, A Baseband Signal Receiver, Probability of Error, Optimum Receiver, optimal of Coherent Reception, Signal Space Representation and Probability of Error, eye diagrams, Cross talk.

Information Theory: Information and entropy, conditional entropy and redundancy, Shannon Fano coding, Mutual Information, Information loss due to noise, source codings – Huffman Code, variable length coding, Source coding to Increase average Information per bit, Lossy source coding.

Unit-IV: Linear Block Codes

Matrix description of Linear Block Codes, Error detection and error Correction capabilities of linear block codes.

Cyclic Codes: Algebraic structure, encoding, syndrome calculation, Decoding.

Convolution Codes: Encoding, Decoding using State, tree and trellis diagrams, Decoding using Viterbi algorithm, Comparison of Error Rates in Coded and Uncoded Transmission.

Unit-V: Spread Spectrum Modulation

Use of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS, Frequency Hopping.

Spread Spectrum, PN - sequences: Generation and Characteristics, Synchronization in Spread Spectrum Systems.

Text Books:

1. Principles of communication systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, McGraw-Hill, 2008.
2. Digital and Analog Communicaton Systems – Sam Shanmugam, John Wiley, 2005.

References:

1. Digital Communications – John G. Proakis, Masoud salehi – 5th Edition, McGraw-Hill, 2008.
2. Digital Communication – Simon Haykin, Jon Wiley, 2005.
3. Communication Systems – B.P. Lathi, BS Publication, 2006.

Course Outcomes:

The student will be able to

1. analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
2. compute the time and frequency domain analysis of the signals in a digital communication system.
3. design blocks of digital communication system for different applications.
4. examine the concepts of block codes and convolution codes.
5. illustrate the principle and gain knowledge about spread spectrum modulation.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

(E310B) MANAGEMENT SCIENCE
(Common to all branches)

Course Objectives:

The student will:

1. understand and making decision related to planning and organisation structure in view of managers and leaders.
2. Study HRM/PMIR by recruitment, selection, training and development.
3. study the PPC through PERT/CPM.
4. study management of marketing MIX physical distribution and PLC strategies.
5. understand the role of management in production through ppc, plant location and layout techniques, work study, quality control.

UNIT- I

Introduction to Management: Types of Business, Nature and Importance of Management, Functions of Management, Taylor's Scientific Management Theory. Fayol's Principles of Management, Douglas McGregor's Theory X and Theory Y, Systems Approach to Management. 7's frame work, Contingency theory, Ethics and corporate social responsibilities.

UNIT- II

Planning & Organisational Structures: Types of planning, nature of planning, level of planning, planning process, Vision, mission, objectives of organization, Departmentation, Decentralization centralization and Recentralization.

Types of Organization structures - Line organization, Line and staff organization, functional organization, Committee organization, Matrix organization, Cellular Organisation, Virtual Organization, Team structure, lean and flat organization structure and their merits, demerits and suitability.

UNIT- III

Operations Management: Types of Plant Layout-Methods of production Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work. Measurement-Statistical Quality Control: $\overline{X}$ chart, R chart, c chart, p chart, Quality, Deming principles, EOQ, ABC Analysis, VED Analysis. TQM, JIT, BPR, Six Sigma.

Project Management (PERT/CPM): Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), identifying critical path.

UNIT-IV

Human Resources Management (HRM): Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Promotion, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating, Bench marking, Compensation, Leadership, Leadership styles, Motivation, Groups and Teams.

UNIT V

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle., Channels of distribution.

Retailing and Basics of Rural Marketing, Digital Marketing, Virtual Marketing, Supply chain management.

TEXT/REFERENCE BOOKS:

1. Aryasri: Management Science, TMH, New Delhi, 2009.
2. Stoner, Management, Pearson, 2009.
3. Kotler Philip & Keller Kevin Lane: Marketing Management PHI, 2009.
4. Koontz, Weihrich, & Aryasri: Principles of Management, TMH, 2009.
5. Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Cengage, 2009.
6. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2009.
7. Memoria & S.V.Ganker, Personnel Management, Himalaya, 2009.
8. Schermerhorn: Management, Wiley, 2009.
9. Parnell: Strategic Management, Biztantra, 2009.
10. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2009.
11. William J. Stevenson & Ceyhun Ozgur: Introduction to Management Science, TMH, 2007.
12. P.Subba Rao : Human Resource Management.
13. Ramaswamy Namakumari: Marketing Management.

Course Outcomes:

The student will be able to:

1. evolve a strategy for a business or service organization.
2. planning and types of organizational structures for a given context.
3. carry out production operations through Work study and SQC.
4. understand the Human resource concepts in detail.
5. analyze markets, competition and pricing strategies, Basics of rural marketing, virtual marketing, Logistics & Digital marketing.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-3-0**	**2**

(E3110) LINEAR IC APPLICATIONS LAB

Course objectives:

The Student will

1. provide a strong foundation on Linear Circuits.
2. familiarize with applications of various IC's.
3. perform the conversion of data from Analog to Digital and Digital to Analog.
4. design combinational logic circuits using digital IC's.
5. gain practical knowledge on A/D and D/A converters.

List of Experiments:

1. Adder, Sub tractor, using IC 741 Op-Amp.
2. Inverting and Non Inverting Comparator using IC 741 Op-Amp.
3. Integrator and Differentiator using IC741 Op-Amp.
4. Active Low Pass & High Pass Butterworth (second Order).
5. Sample and Hold circuit using Op-Amp.
6. RC Phase Shift and Wien Bridge Oscillators using IC 741 Op-Amp.
7. Wave form generators using IC741.
8. IC 555 timer in Monostable and Astable operation.
9. Schmitt trigger circuits using IC 741 & IC 555.
10. IC 565 – PLL.
11. Voltage regulator IC 723, three terminal voltage regulators- 7805, 7809, 7912.
12. A/D and D/A converters.

EQUIPMENT REQUIRED:

1. 20 MHz/ 40 MHz/60 MHz Oscilloscopes.
2. 1 MHz Function Generator (Sine, Square, Triangular and TTL) .
3. Regulated Power Supply.
4. Multimeter / Volt Meter.

Course outcomes:

The Student will be able to

1. design basic application circuits using op-amp.
2. demonstrate and implement the second order Butterworth filter.
3. develop practical knowledge on IC 555 and IC741.
4. construct Schmitt trigger circuit.
5. analyze the working of A/D and D/A converters.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-3-0**	**2**

(E3111) DIGITAL COMMUNICATIONS LAB

Course Objectives:

The student will

1. classify the different techniques in modulation and demodulation in communication systems.
2. perform experiments on various digital communications modulation schemes using kits.
3. understand the functioning of Digital modulation techniques.
4. study the spectral Characteristics of PAM, QAM.
5. gain practical knowledge on PCM generation an detection.

List of Experiments:

1. Pulse Amplitude Modulation and Demodulation.
2. Pulse Width Modulation and Demodulation.
3. Pulse Position Modulation and Demodulation.
4. PCM Generation and Detection.
5. Differential Pulse Code Modulation.
6. Delta Modulation.
7. Time Division Multiplexing of 2 Band Limited Signals.
8. Amplitude shift keying: Generation and Detection.
9. Frequency shift keying: Generation and Detection.
10. Phase shift keying: Generation and Detection.
11. Study of spectral Characteristics of PAM, QAM.
12. DPSK: Generation and Detection.
13. QPSK: Generation and Detection.

NOTE: Minimum 12 experiments to be conducted

Course Outcomes:

The student will be able to

1. demonstrate the ability to design and conduct experiments, analyze and interpret data.
2. employ the working of Pulse modulation and demodulation techniques.
3. demonstrate the working of PCM generation and detection.
4. implement the operation of digital modulation techniques.
5. analyse the performance of modulation and demodulation techniques in various transmission environments**.**

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - I Semester	**0**	**0-3-0**	**2**

(E3112) DIGITAL IC APPLICATIONS LAB

Course Objectives:

The student will

1. verify the functional table of various digital IC's.
2. simulate and synthesize the digital design using E cad tools.
3. gain knowledge of VHDL/ Verilog tool.
4. understand the Stack and queue implementation using RAM 74189.
5. simulate the internal structure of various ICs.

To Verify The Functionalityof the following 74 series TTL ICs.

1. D Flip -Flop (74LS74) and JK Master-Slave Flip-Flop (74 LS73).
2. Decade counter (74LS90) and UP-Down Counter (74 LS192).
3. Universal Shift registers- 74LS194/ 195.
4. 3-8 decoder-74LS138.
5. 4 bit comparator 74LS85.
6. 8X1 Multiplexer-74151 and 2X4 demultiplexer-74155.
7. RAM (16X4) - 74189 (read and write operations).
8. Stack and queue implementation using RAM**,** 74189.

Simulate the internal structure of the following Digital IC's using VHDL / VERILOG and verify the operations of the Digital IC's (Hardware) in the Laboratory

1. Logic Gates- 74XX.
2. Half Adder, Full Adder.
3. 3-8 Decoders -74138.
4. 8 x 1 Multiplexer -74X151.
5. 2x4 Demultiplexer-74X155.
6. 4 bit Comparator-74X85.
7. D Flip-Flop 74X74.
8. Decade counter-74X90.

For Software Simulation

1. Computer Systems.
2. LAN Connections (Optional).

3. Operating Systems.
4. VHDL/ VERILOG.
5. FPGAS/CPLDS (Download Tools).

Course Outcomes:

The student will be able to

1 analyze the functionality of various digital IC's.
2 design various digital circuits using E cad tools.
3 simulate the internal structure of the various Digital IC's using VHDL / VERILOG.
4 acquire practical knowledge about stack and queue implementation.
5. demonstrate the Stack and queue implementation using RAM, 74189.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E324A) MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:
The Student will

1. understand the basic 16-bit microprocessor architecture and its functionalities.
2. develop the microprocessor based programs for various applications.
3. make the interfacing between microprocessor and various peripherals.
4. understand basic feature of 8051 controller.
5. develop the microcontroller based programs for various applications.

UNIT-I: 8086 Architecture: 8086 Architecture-Functional diagram, Register organization, memory segmentation, programming model, memory addresses.
Physical memory organization, architecture of 8086, signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

UNIT-II: Instruction set and assembly language programming of 8086: instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical.
Branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT-III: I/O Interface: 8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.
Interfacing with advanced devices: memory interfacing to 8086, interrupt structure of 8086, vector interrupt table, interrupt service routine. Communication interface: serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

UNIT-IV: Introduction to Microcontrollers: overview of 8051 microcontroller, architecture, I/O ports.
Memory organization, addressing modes and instruction set of 805, simple programs.

UNIT-V: 8051 Real Time control: programming time interrupts, programming external hardware interrupts.
Programming the serial communication interrupts, programming 8051 Timers and counters.

TEXT BOOKS:

1. D.V.Hall, Microprocessors and interfacing, TMGH,2nd Edition 2006.
2. Kenneth.J.Ayala, The 8051 Microcontroler, 3rd Ed., Cengage Learning.

REFERENCE BOOKS:

1. Advanced Microprocessors and peripherals-A.K.Ray and K.M Bhurchandani, TMH, 2 nd Edition 2006.
2. The 8051 Microcontrollers. Architecture and programming and applications-K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro computer system 8086/8088 family architecture. Programming and design-Du and GA Gibson, PHI 2nd Edition.

Course Outcomes:

The Student will be able to

1. analyze 8086 microprocessors architectures and its functionalities.
2. design 8086 Microprocessor based systems for real time applications using programming languages like Assembly Language and MASM.
3. interface and program external peripherals and I/O devices to 8086 microprocessor.
4. explain the basics of 8051 microcontroller's architecture and its functionalities.
5. design microcontroller based projects for real time applications.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**1-0-0**	**4**

(E324B) DIGITAL SIGNAL PROCESSING

Course Objectives:
The Student will

1. get fundamental concepts of discrete time signals, impulse response, sequence, zero-state solutions.
2. understand DFS, DTFT and DFT concepts and its applications.
3. analyze and designing of analog & digital IIR filter and application on DSP.
4. analyze and design analog & digital FIR filter and application on DSP.
5. learn the concept of finite word length and multi-rate signal processing.

Unit I: Introduction: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality, linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems.
Discrete Fourier series: DFS representation of Periodic Sequences, Properties of Discrete Fourier Series, Relation between DFT, DTFT and ZT.

Unit II: Discrete Fourier Transforms & Fast Fourier Transforms
Discrete Fourier Transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT: Over-lap Add method, Over-lap Save method.
Fast Fourier Transforms: Fast Fourier transforms (FFT) - Radix-2 decimation-in-time and decimation-in-frequency FFT Algorithms, Inverse FFT.

Unit III: IIR Digital Filters
Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from analog filters, Step and Impulse invariant techniques, Bilinear transformation method, Spectral transformations.
Realization of IIR filters – Direct, Canonic, Cascade and Parallel forms.

Unit IV: FIR Digital Filters
Characteristics of FIR Digital Filters, Frequency response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.
Realization of FIR Filters: Direct form, cascade realization and Linear phase Realization.

Unit V: Multirate Digital Signal Processing
Introduction, down sampling, Decimation, Up sampling, interpolation, Sampling Rate Conversion, conversion of band pass signals, Concept of resampling, Applications of multi rate signal processing.

Finite Word Length Effects : Limit cycles, Overflow oscillations, Round-off noise in IIR digital filters, Computational output round off noise, Methods to prevent overflow, Tradeoff between round off and overflow noise, Measurement of coefficient quantization effects through pole-zero movement, Dead band effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Digital Signal Processing-R.Ramesh Babu, SCITECH 5TH Ed.

REFERENCE BOOKS:

1. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
2. Digital Signal Processing – Trun Kumar Rawat, Oxford Publications, 2015.
3. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009.

Course Outcomes:

The student will be able to

1. define fundamental concepts of discrete time signals, impulse response, sequence, zero-state solutions.
2. distinguish the results using Fourier transforms, Laplace Transform, Z-transform and application of DFT and FFT in signal processing.
3. design IIR filters using Butterworth and Chebyshev technique.
4. design FIR filters using window technique.
5. apply & access the finite word length and multi-rate signal processing in different communication systems.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E324C) COMPUTER ORGANIZATION AND OPERATING SYSTEMS
(Professional Elective-I)

Course Objectives:
The Student will

1. have a thorough understanding of the basic structure and operation of a digital computer.
2. discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
3. study the different ways of communicating with I/O devices and standard I/O interfaces.
4. study the hierarchical memory system including cache memories and virtual memory.
5. demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and dead locks.

UNIT-1: Basic Structure of computers: computer Types, Functional unit, Basic operational concepts, Bus Structures, Software, Performance, Multiprocessors and Multi computers, Data Representation, Fixed point representation, Floating –point representation.
Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro Operations, Shift Micro operations, Arithmetic Logic shift unit, Instruction codes, and computer Registers computer instructions-instruction cycle.

UNIT-II: Memory-Reference instructions: input-output and interrupt, STACK Organization, instruction formats, addressing modes.
DATA transfer and manipulation, program control, reduced instruction set computer.

UNIT-III: Micro programmed control: control memory, Address sequencing, micro program examples, design of control unit, hard wired control, micro programmed control.
The Memory System: Basic concepts of semiconductor RAM memories, read-only memories, cache memories performance considerations, virtual memories secondary storage, introduction to RAID.

UNIT-IV: Input-Output Organization: peripheral devices, input-output interface. Asynchronous data transfer modes, priority interrupt, direct memory access, input-output processor (IOP).

Serial communication introduction to peripheral components, interconnect (PCI) Bus, introduction to standard serial communication protocols like RS232, USB, IEEE1394.

UNIT-V: Operating system overview: overview of computer operating systems functions, protection and security, Distributed systems, special purpose systems, operating systems structures operating system services and systems calls, system programs, operating systems generation.

Memory Management: Swapping, contiguous Memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-Replacement algorithms, allocation of frames, thrashing case studies –UNIX, Linux, windows.

Text Books:

1. Computer organization- carl Hamacher, Zvonks Vranesic, safea Zaky, 5th Edition, McGraw Hill.
2. Computer systems Architecture- M Moris Mano,3rd Edition, pearson.

References:

1. Computer organization and Architecture –William stallings 6th Edition, Pearson.
2. Structured computer organization-Andrew S.Tanenbaum, 4th Edition PHI.
3. Fundamental of computer organization and design-Sivaraama Dandamudi springer int. Edition.

Course Outcomes:

The Student will be able to:

1. design structure of a digital computer.
2. analyze Arithmetic operations of binary number system.
3. organize the Control Unit, Arithmetic and Logical Unit, Memory Unit and the I/O unit.
4. compute system functions, types, system calls.
5. analyze Memory management techniques and dead lock avoidance.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E324D) SPREAD SPECTRUM COMMUNICATIONS
(Professional Elective-I)

Course Objectives:
The student will

1. study the spread Spectrum and its basic applications in communication.
2. be given with an exposure to different types of Spread Spectrum. techniques.
3. know the commercial applications of Spread Spectrum.
4. understand CDMA principles.
5. analyse performance of Spread Spectrum Systems in Jamming environments.

UNIT –I: Introduction to Spread Spectrum Systems: Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct Sequence Spread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency Hop Spread Spectrum, Code Division Multiple Access.
Binary Shift Register Sequences for Spread Spectrum Systems: Introduction, Definitions, Mathematical Background and Sequence Generator Fundamentals, Maximal Length Sequences, Gold Codes.

UNIT -II: Code Tracking Loops: Introduction, Optimum Tracking of Wideband Signals, Base Band Delay-Lock Tracking Loop, Tau-Dither Non- Coherent Tracking Loop, Double Dither Non-Coherent Tracking Loop.

UNIT -III: Initial Synchronization of the Receiver Spreading Code: Introduction, Problem Definition and the Optimum Synchronizer.
Serial Search Synchronization Techniques, Synchronization using a Matched Filter, Synchronization by Estimated the Received Spreading Code.

UNIT -IV: Cellular Code Division Multiple Access (CDMA) Principles: Introduction, Wide Band Mobile Channel, the Cellular CDMA System, Single User Receiver in a Multi User Channel.
CDMA System Capacity, Multi-User Detection in CDMA Cellular Radio: Optimal Multi-User Detection, Linear Suboptimal Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques.

UNIT -V: Performance of Spread Spectrum Systems in Jamming Environments: Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding.

Performance of Spread Spectrum Systems with Forward Error Correction: Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding and Bit-Error Rate.

Text Books:

1. Rodger E Ziemer, Roger L. Peterson and David E Borth —Introduction to Spread Spectrum Communication- Pearson, 1st Edition, 1995.
2. Mosa Ali Abu-Rgheff —Introduction to CDMA Wireless Communications, Elseveir Publications, 2008.

Reference Books:

1. George R. Cooper, Clare D. Mc Gillem —Modern Communication and Spread Spectrum, McGraw Hill, 1986.
2. Andrew j. Viterbi—CDMA: Principles of spread spectrum communication, Pearson Education, 1st Edition, 1995.
3. Kamilo Feher —Wireless Digital Communications, PHI, 2009.
4. Andrew Richardson—WCDMA Design Handbook, Cambridge University Press, 2005.
5. Steve Lee - Spread Spectrum CDMA, McGraw Hill, 2002.

Course Outcomes:

The Student will be able to

1. depict the features spread spectrum and multicarrier techniques.
2. describe the types and advantages of spread spectrum modulation formats.
3. analyze the performance of spread spectrum modulation formats.
4. describe techniques for reducing the impact of interference on spread spectrum signals.
5. get knowledge about CDMA basic principles and analyse performance of Spread Spectrum Systems in Jamming environments and forward error correction.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E324E) DIGITAL SYSTEM DESIGN
(Professional Elective-I)

Course Objectives:
The Student will

1. understand the Minimization and Transformation of Sequential Machine.
2. design various Combinational circuits in digital design.
3. demonstrate SM Charts for digital circuits.
4. familiarize Fault Modeling & Test Pattern Generation in digital circuits.
5. gain knowledge about Fault Diagnosis in Sequential Circuits.

UNIT -I: Minimization and Transformation of Sequential Machines

The Finite State Model – Capabilities and limitations of FSM – State equivalence and machine minimization – Simplification of incompletely specified machines.
Fundamental mode model – Flow table – State reduction – Minimal closed covers – Races, Cycles and Hazards.

UNIT -II: Digital Design

Digital Design Using ROMs, PALs and PLAs, BCD Adder, 32 – bit adder, State graphs for control circuits, Scoreboard and Controller, A shift and add multiplier, Array multiplier, Keypad Scanner, Binary divider.

UNIT -III: SM Charts

State machine charts, Derivation of SM Charts, Realization of SM Chart, Implementation of Binary Multiplier, dice game controller.

UNIT -IV: Fault Modeling & Test Pattern Generation

Logic Fault model – Fault detection & Redundancy- Fault equivalence and fault location – Fault dominance – Single stuck at fault model – Multiple stuck at fault models –Bridging fault model.
Fault diagnosis of combinational circuits by conventional methods – Path sensitization techniques, Boolean Difference method – Kohavi algorithm – Test algorithms – D algorithm, PODEM, Random testing, Transition count testing, Signature analysis and test bridging faults.

UNIT -V: Fault Diagnosis in Sequential Circuits

Circuit Test Approach, Transition Check Approach – State identification and fault detection experiment, Machine identification, Design of fault detection experiment.

TEXT BOOKS:

1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.
3. Logic Design Theory – N. N. Biswas, PHI.

REFERENCE BOOKS:

1. Switching and Finite Automata Theory – Z. Kohavi , 2nd Ed., 2001, TMH.
2. Digital Design – Morris Mano, M.D.Ciletti, 4th Edition, PHI.
3. Digital Circuits and Logic Design – Samuel C. Lee , PHI.

Course Outcomes:

The student will be able to

1. apply the Minimization and Transformation of Sequential Machine.
2. design various Combinational circuits.
3. construct SM Charts for digital circuits.
4. analyze Fault Modeling & Test Pattern Generation.
5. examine Fault Diagnosis in Sequential Circuits.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E324F) RF CIRCUITS DESIGN
(Professional Elective-II)

Course Objectives:

The Student will

1. introduce the theory and concept of radio frequency integrated circuits.
2. study fundamental concepts of transmission line theory, high frequency circuit behaviour.
3. understand designing and tuning and matching networks filter networks, power amplifiers, two port networks and S-parameters.
4. analyze the performance parameters of radio frequency circuits.
5. be able to use CAD tools such as Sonnet in the design of RF circuits.

Unit-I: Introduction: Importance of radio frequency design, Dimensions and units, frequency spectrum. RF behavior of passive components: High frequency resistors, capacitors and inductors.

Chip components and Circuit board considerations: Chip resistors, chip capacitors, surface mounted inductors.

Unit-II: Transmission Line Analysis: Two-wire lines, Coaxial lines and Microstrip lines. Equivalent circuit representation, Basic laws, Circuit parameters for a parallel plate transmission line. General Transmission Line Equation: Kirchhoff voltage and current law representations, Traveling voltage and current waves, general impedance definition, Lossless transmission line model.

Microstrip Transmission Lines. Terminated lossless transmission line: Voltage reflection coefficient, propagation constant and phase velocity, standing waves. Special terminated conditions: Input impedance of terminated lossless line, Short circuit transmission line, Open circuit transmission line, Quarter wave transmission line. Sourced and Loaded Transmission Line: Phasor representation of source, Power considerations for a transmission line, input impedance matching, return loss and insertion loss.

Unit-III: The Smith Chart : Reflection coefficient in Phasor form, Normalized Impedance equation, Parametric reflection coefficient equation, graphical representation, Impedance transformation for general load, Standing wave ratio, Special transformation conditions. Admittance Transformations: Parametric admittance equation, Additional graphical displays.

Parallel and series Connections : Parallel connections of R and L connections, Parallel connections of R and C connections, Series connections of R and L connections, Series connections of R and C connections, Example of a T Network.

Unit-IV: RF Filter Design : Filter types and parameters, Low pass filter, High pass filter, Bandpass and Bandstop filter, Insertion Loss. Special Filter Realizations: Butterworth type filter, Chebyshev type filters, Denormalization of standard low pass design.
Filter Implementation : Unit Elements, Kuroda's Identities and Examples of Microstrip Filter Design. Coupled Filters: Odd and Even Mode Excitation, Bandpass Filter Design, Cascading bandpass filter elements, Design examples.

Unit-V: Active RF Components: Semiconductor Basics : Physical properties of semiconductors, PN-Junction, Schottky contact. Bipolar-Junction Transistors: Construction, Functionality, Temperature behaviour, Limiting values. RF Field Effect Transistors: Construction, Functionality, Frequency response, Limiting values. High Electron Mobility.
Transistors: Construction, Functionality, Frequency response. Active RF Component Modeling: Transistor Models : Large-signal BJT Models, Small-signal BJT Models, Large-signal FET Models, Small-signal FET Models. Measurement of Active Devices: DC Characterization of Bipolar Transistors, Measurements of AC parameters of Bipolar Transistors, Measurement of Field Effect Bipolar Transistors Transistor Parameters.

TEXT BOOK

1. RF Circuit Design Theory & Applications – prentice hall publisher (2^{nd}).
2. RF Circuit Design: Theory & Applications, 2nd Edition.

REFERENCE BOOKS

1. RF Circuit Design: Theory and Applications by Reinhold Ludwig.

Course Outcomes:

The student will be able to

1. apply knowledge of general RF circuits, components and Systems of resonant circuits.
2. use smith Chart in RF applications.
3. design impedance matching networks and passive RF filters of two port networks and S-parameters of RF power amplifiers.
4. use CAD tools in RF circuit design.
5. gain knowledge of active RF components.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

(E324G)Telecommunication Switching Systems and Networks
(Professional Elective-II)
(Common to ECE, ECM)

Course Objectives:
The student will

1. get knowledge about the telecommunication industry and its services and market.
2. Understand the operational characteristics of switching techniques.
3. study the working principle of different Switching types.
4. study the working principles of switching networks.
5. understand the working concept of Digital Subscriber Access.

UNIT I: Switching Systems
Evolution of Telecommunications; Basics of a switching system, functions of a switching system, Strowger switching components, step by step switching, Design parameters;100 line switching system;1000 line Blocking Exchange; 10,000 Line exchange, Principle of Crossbar switching; Crossbar switch configurations; Cross point Technology, Crossbar Exchange organization; A general trunking; Electronic and digital switching systems.
Telecommunications Traffic: Introduction; Unit of traffic; congestion; Traffic measurement; A Mathematical model; Lost-call systems-Theory; Traffic performance; Loss systems in Tandem; Use of traffic tables; Queuing systems-the second Erlang distribution ; Probability of Delay; Finite Queue capacity; some other useful results; Systems with a single server; Queues in tandem; Delay tables; Applications of Delay formulae.
UNIT II: Switching Networks
Introduction, Single stage networks; Grading Principles; Two, Three and four stage networks.
Time Division switching: Basic time division space switching; basic time division time switching; Time multiplexed space switching; Time multiplexed time switching; Combination switching; Three stage Combination switching.
Control of switching systems: call processing functions-sequence of operations; signal exchanges; State transition diagrams; common control; Reliability; Availability and security, Stored program control.
UNIT III: Signaling
Introduction; Customer Line signaling; Audio frequency Junctions and trunk circuits; FDM carrier systems-Out band signaling; Inland (VF) signaling; PCM signaling; Inter Register signaling.
Common channel signaling principles- General signaling networks; CCITT signaling system number 6; CCITT signaling system number 7; High level data link control protocol; Signal units; The signaling information field.

UNIT IV: Packet Switching

Introduction; Statistical multiplexing; Local and wide Area networks-Bus networks, Ring networks, comparison of bus and Ring networks, Optical fiber Networks; Large scale networks; Datagram and virtual circuits; Routing; Flow control; Standards; Frame relay; Broadband networks-General; Asynchronous Transfer mode; ATM switches.

UNIT V: Networks

Introduction, Analog Networks, Integrated Digital Networks, Integrated services Digital Networks; Cellular Radio Networks; Intelligent Networks; private Networks; charging; Routing-General, Automatic, Alternative routing.

Text Books:

1. Telecommunications Switching and Traffic Networks, J.E Flood, Pearson Eduction, 2006.
2. Telecommunications Switching systems and Networks, Tyagarajan Viswanathan, Prentice hall of India Pvt. Ltd., 2006.

References:

1. Digital Telephony, John C Bellamy, John Wiley International Student Edition, 3rd Edition, 2000.
2. Data Communications and Networking, Behrouz A. Ferouzan, TMH, 2nd Edition, 2000.
3. Introduction to Data Communications and Networking, Tomasi, Pearson Education, 1st Edition, 2007.

Course Outcomes:

The student will be able to:

1. demonstrate switching operation.
2. apply the concepts of probability to resolve traffic and network related issues.
3. solve problems in traffic engineering that covers various systems and blocking models, numbering plan, charging and organize an exchange.
4. analyze Switching hierarchy, routing and Transmission plan.
5. design ST/TS switches to meet the specifications.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

(E3210) MICROPROCESSORS AND MICROCONTROLLERS LAB

Course Objectives:

The Student will

1. develop assembly level programs and providing the basics of the processors.
2. gain solid foundation on interfacing the external devices to the processor.
3. create solutions for the real time problems.
4. Understand the working of UART operation in 8051.
5. get knowledge of DMA controller 8237/8257.

List of Experiments:

The Following programs/experiments are to be written for assembler and execute the same with 8086 and 8051 kits.

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessors using 8255.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/ Counter in 8051.
12. Program and verify Interrupt handling in 8051.
13. UART Operation in 8051.
14. Communication between 8051 kit and PC.
15. Interfacing LCD to 8051.
16. Interfacing Matrix/ Keyboard to 8051.
17. Data Transfer from Peripheral to Memory through DMA controller 8237 / 8257.

Note: - Minimum of 12 experiments to be conducted.

Course Outcomes:

The Student will be able to

1. design and implement microprocessor, microcontroller based systems for various real time applications.
2. analyze the programs using MASM.
3. interface microprocessor with various peripherals.
4. interface microcontroller with various peripherals.
5. create novel products and solutions for the real time problems.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

(E3211) DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

The Student will

1. apply theoretical knowledge on a practical basis
2. familiarize with knowledge of MATLAB programming & functions.
3. analyze and design different signals & filters using MATLAB
4. get the basic knowledge of trainer kit TMS320C6713 DSP Processors.
5. gain practical knowledge on implementation of different filters.

The programs shall be implemented in software (Using MATLAB / Lab view / C programming/OCTAVE Equivalent) and hardware (Using TI / Analog devices / Motorola / Equivalent DSP processors).

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. To find DFT / IDFT of given DT signal.
3. To find frequency response of a given system given in (Transfer Function/ Differential equation form).
4. Implementation of FFT of given sequence
5. Determination of Power Spectrum of a given signal(s).
6. Implementation of LP FIR filter for a given sequence.
7. Implementation of HP FIR filter for a given sequence.
8. Implementation of LP IIR filter for a given sequence
9. Implementation of HP IIR filter for a given sequence.
10. Generation of Sinusoidal signal through filtering.
11. Generation of DTMF signals.
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D sampling rate converters.
15. Audio application such as to plot a time and frequency display of microphone plus a cosine using DSP. Read a .wav file and match with their respective

spectrograms.

16. Noise removal: Add noise above 3 KHz and then remove, interference suppression using 400 Hz tone.
17. Impulse response of first order and second order systems.

Note: - Minimum of 12 experiments has to be conducted.

Course Outcomes:

The student will be able to

1. work with MATLAB functions.
2. analyze and design different signals and filters.
3. provide the basic knowledge of trainer kit TMS320C6713 DSP Processors.
4. gain practical knowledge on implementation of different filters.
5. design new DSP based projects.

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B.Tech. ECE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-2-0**	**1**

(E3212) EMPLOYABILITY SKILLS
(Common to EEE, ECE, CSE, IT & ECM)

Course Objectives:

The student will

1. develop employability skills in an individual.
2. enhance the listening skills.
3. develop reading, speaking and writing skills.
4. apply creativity skills.
5. confidently face interviews.

LISTENING:

1. Listening Comprehension-
exercises • Active Listening

READING:

2. Reading Comprehension – 4 Passages
3. Book Review-Any Novel among the list prescribed by the Department
4. Cloze Test

SPEAKING:

5. Extempore • Ad Making
6. One Act Plays • Poster presentation
7. Public Speaking • Mock Interviews
8. Group Discussions • Assertiveness
9. Interpersonal skills

WRITING:

10. Team building

Vocabulary :

11. Business Vocabulary

Creativity :

12. 1 Short Films • Leadership
2
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Text Books:

1. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. Enhancing Employability @ Soft Skills by Shalini Verma –Pearson.

Reference Books :

1. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing

Company Ltd.
2. Communication Skills by Leena Sen, Prentice-Hall of India, 2005.

Course Outcomes:

The student will be able to

1. identify why employability skills are needed
2. set personal learning goals.
3. apply listening, reading, speaking and writing skills in real life.
4. develop creativity to achieve goals.
5. enhance the vocabulary by practice.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414A) MICROWAVE ENGINEERING

Course Objectives:
The Student will

1. understand the analysis of Waveguides and gain complete knowledge about Microwave Components.
2. explain theoretical operation of microwave sources, wave guides, components and devices.
3. analysis and study characteristics of microwave tube Generators and Klystron tube
4. study methods of measuring various parameters in microwave devices.
5. study various applications of microwave engineering.

Unit-I

Microwave Transmission Lines – I: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Impossibility of TEM Mode, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Illustrative Problems.

Microwave Transmission Lines – II: Rectangular Guides - Cavity Resonators– Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Power Transmission and Power Losses, Micro strip Lines– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor. Illustrative Problems.

Unit-II

Waveguide Components And Applications - I: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide Windows, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Different Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters – Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions – E plane and H plane Tees, Magic Tee. Directional Couplers – 2 Hole, Bethe Hole types. Illustrative Problems.

Waveguide Components And Applications - II: Scattering Matrix– Significance, Formulation and Properties, S Matrix Calculations for – Two port Junctions, E plane and H plane Tees, Magic Tee, Circulator and Isolator Ferrites– Composition and Characteristics, Faraday Rotation; Ferrite Components – Gyrator, Isolator, Circulator. Scattering Matrix– Illustrative Problems.

Unit-III

Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. O-type tubes: Two Cavity Klystrons –Structure,

Reentrant Cavities, Velocity Modulation Process and Applegate Diagram.

Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Illustrative Problems.

Unit-IV

Introduction, Cross-field effects, Magnetrons – Different Types, Cylindrical Traveling Wave Magnetron – Hull Cut-off and Hartree Conditions.
Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics. Illustrative Problems.

Unit-V

Introduction, Classification, Applications. TEDs – Introduction, Gunn Diodes – Principle, RWH Theory, Characteristics, Basic Modes of Operation - Gunn Oscillation Modes, LSA Mode, Introduction to Avalanche Transit Time Devices- Introduction, IMPATT and TRAPATT Diodes– Principle of Operation and Characteristics.
Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions; Microwave Power Measurement – Bolometers. Measurement of Attenuation, Frequency Standing Wave Measurements – Measurement of Low and High VSWR, Cavity Q. Impedance Measurements.

TEXT BOOKS:

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

REFERENCE BOOKS:

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.

Course Outcomes:

The student will be able to

1. measure the various parameters in microwave engineering.
2. design & analyze the micro wave integrated circuits.
3. obtain knowledge about various waveguide and microwave components.
4. illustrate the concept of microwave measurements.
5. apply basic idea of the microwave theory in various applications & analyze them.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414B) VLSI DESIGN

Course Objectives:

The Student will

1. visualize MOS fabrication technologies and understand electrical properties of MOS, CMOS and Bi CMOS circuits.
2. draw integrated circuit layouts following design rules.
3. learn combinational circuit, do verification, power optimization and network testing.
4. use power optimization techniques.
5. design validation procedures and testing of sequential circuits.

Unit-I- Introduction

Introduction to IC Technology-MOS, PMOS, NMOS, CMOS and Bi-CMOS.

Basic Electric Properties: Basic electrical Properties of MOS and Bi-CMOS Circuits: Ids-Vds relationships. MOS transistor threshold voltage, gm, gds, Figure of merit, pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS inverters.

Unit-II- VLSI Circuit Design Processes

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and layout, 2 μm CMOS design rules for wires.

Contacts and Transistors layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS Circuits.

Unit-III - Gate Level Design

Logic Gates and Other complex gates, Switch logic, alternate gate circuits , time delays Driving large capacitive loads, wiring capacitance, Fan-in, Fan-out, Choice of layers.

Unit-IV- Data path Subsystems

Subsystems Design, Shifters, Adders, ALUs, Multipliers, Parity generators, comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

Unit-V- Programmable Logic Devices

PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test chip level Test Techniques.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems-Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, PHI, 2005 Edition.
2. CMOS VLSI Design-A Circuits and systems perspective,Neil H.E. Weste,David Harris, Ayan Banerjee, 3rd Ed, Pearson,2009.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic Circuit and system perspectives-Ming-BO Lin, CRC Press, 2011.
2. CMOS Logic circuit design –John. P.Uyemura, Springer, 2007.
3. Modem VLSI Design-Wayne Wolf, Pearson Education, 3rd Edition 1997.

Course Outcomes:

The Student will be able to

1. interpret the steps taken for MOS fabrication technologies.
2. analyze electrical behaviour of MOS, CMOS and Bi CMOS circuits.
3. construct the layout of integrated circuits following design rules.
4. design combinational circuit and sequential circuits using different clocking disciplines.
5. compare various Programmable logic devices and perform CMOS testing.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414C) CELLULAR AND MOBILE COMMUNICATIONS

(Professional Elective-III)

Course Objectives:

The Student will

1. have an overview of wireless and mobile communications in different generations.
2. understand mobile technologies like GSM and CDMA.
3. study the operation of basic cellular system and performance criterion, handoff mechanism.
4. understand the design of cellular mobile system.
5. develop the ability to search, select, organize and present information on new technologies in mobile and cellular communications.

Unit-I Introduction to Cellular Mobile Radio Systems

Limitations of conventional mobile telephone systems, Basic Cellular Mobile System, First, second, third and fourth generation cellular wireless systems, Uniqueness of mobile radio environment-Long term fading, Factors influencing short term fading.

Parameters of mobile multipath fading-Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, Types of small scale fading.

Unit-II Fundamentals of Cellular Radio System Design

Concept of frequency reuse, Co-channel interference, Co-channel Interference reduction factor, Desired C/I from a normal case in a Omni directional antenna system, system capacity, Trunking and grade of service, Improving coverage and capacity in cellular systems- Cell splitting, Sectoring, Microcell zone concept.

Measurement of real time Co-Channel interference, Design of antenna system, Antenna parameters and their effects, Diversity techniques-Space diversity, Polarization diversity, Frequency diversity, Time diversity. Adjacent channel interference, Near end far end interference, Cross talk, Effects on coverage and interference by power decrease, Antenna height decrease, Effects of cell site components, UHF TV interference.

Unit-III Cell Coverage for Signal and Traffic

Signal reflections in flat and hilly terrain, Effect of human made structures, Phase difference between direct and reflected paths, Constant standard deviation, Straight line path loss slope.

General formula for mobile propagation over water and flat open area, Near and long distance propagation, Path loss from a point to point prediction model in different conditions, merits of Lee model.

Unit-IV Cell Site and Mobile Antennas

Sum and difference patterns and their synthesis, Coverage-omni directional antennas, Interference reduction- directional antennas for interference reduction, Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

Unit-V Frequency Management and Channel Assignment& Handoffs

Numbering and grouping, Setup access and Paging channels, Channel assignments to cell sites and mobile units, Channel sharing and Borrowing, Sectorization, Overlaid cells, Non fixed channel assignment.

Handoff initiation, Types of handoff, Delaying handoff, Advantages of handoff, Power difference handoff, Forced handoff, Mobile assisted and soft handoff. Intersystem handoff, Introduction to dropped call rates and their evaluation.

TEXT BOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2nd Edn., 1989.
   Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

REFERENCE BOOKS:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Ed., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher,Pearson Education, 2005.
3. Wireless communications theory and techniques, Asrar U. H .Sheikh, Springer, 2004.

Course Outcomes:

The Student will be able to

1. illustrate the basic concepts of Cellular mobile radio systems.
2. measure the performance of a cellular system.
3. describe the concept of frequency reuse.
4. gain knowledge about different mobile antennas.
5. discuss the concept of channel assignment and handoff in wireless communication.

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B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414D) COMPUTER NETWORKS

(Professional Elective-III)

Course Objectives:

The Student will

1. build an understanding of the fundamental concepts of computer networking.
2. understand the network layer and Transport Layer architecture.
3. familiarize with the basic taxonomy and terminology of the computer networking area.
4. introduced to advanced networking concepts, in computer networking.
5. gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Unit-I

Introduction: Introduction to networks, internet, protocols and standards, the OSI model, layers in OSI model, TCP/IP suite, Addressing, Analog and digital signals.

Unit-II

Transmission Switching & Control: Digital transmission, multiplexing, transmission media, circuit switched networks, Datagram networks, virtual circuit networks, switch and Telephone network.

Data link layer: Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels, HDLC, point to point protocols, IPV6.

Unit-III

MAC Layer and Back bone Network: Random access, controlled access, channelization, IEEE standards, Ethernet, Fast Ethernet, Ethernet, wireless LANs, Bluetooth.

Connecting LANs, backbone networks and virtual LANs, Wireless WANs, SONET, frame relay and ATM.

Unit-IV

Network Layer & Transport Layer: Logical addressing, internetworking, tunneling, address mapping, ICMP, IGMP, forwarding, uni-cast routing protocols, multicast routing protocols. Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control.

QoS, integrated services, differentiated services, QoS in switched networks.

Unit-V

Application Layer: Domain name space, DNS in internet, electronic mail, FTP, WWW. HTTP, SNMP, multi-media, network security.

TEXT BOOKS:

1. Data Communications and Behrouz A, Forouzan, Fourth Edition networking TMH, 2006.
2. Computer Networks Andrew S Tanenbau, 4th Edition, pearson Education.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks S. Keshav, 2nd Edition. Pearson Education.
2. Understanding communications and Networks , 3rd Edition, W.A.Shay, Cengage Learning.
3. Computer and Communication Networks, Nader F.Mir, Internet F.

Course Outcomes:

The Student will be able to

1. recognize basic computer network technology.
2. explain Data Communications System and its components.
3. identify the different types of network topologies and protocols.
4. enumerate the layers of the OSI model, TCP/IP and explain the functions of each layer.
5. analyze the different types of network devices and their functions within a network.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414E) DSP PROCESSORS AND ARCHITECTURES
(Professional Elective-III)

Course Objectives:
The student will
1. understand the architectures of DSP processors.
2. illustrate the functioning of typical real time DSP systems.
3. gain knowledge on various fixed point DSP processors.
4. gain knowledge on memory and I/O interfacing.
5. know the implementation of DSP algorithms and FFT implementation.

Unit-I
Introduction to DSP Processors: Digital Signal Processors, various architectures: VLIW Architecture, Multiprocessor DSPs, SHARC, SIMD, MIMD, RISC and CISC.
Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branch effects, Interrupt effects, Pipeline Programming models.
Unit-II
Typical real-time DSP systems: Data representations and arithmetic, Analog -to –digital conversion process, Uniform and non-uniform quantization and encoding, Oversampling in A/D conversion.
Digital to analog conversion process: signal recovery, the DAC, Anti-imaging filtering, Oversampling in D/A conversion, Analog I/O interface for real-time DSP systems, sources of errors in DSP implementation, real time implementation considerations.
Unit-III
Fixed-Point DSP processors: Architecture of TMS 320C 5X, C54X Processors, addressing modes, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming.
On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors, speed issues.
Unit-IV
Memory and I/O Interfacing: External bus interfacing signals, Memory interface, Parallel I/O interface: Programmed I/O, Interrupts and I/O, Direct memory access (DMA).
Hardware interfacing, Multichannel Buffered Serial Port (McBSP), McBSP Programming, CODEC interface circuit.
Unit-V
Implementation of DSP algorithms: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.
An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX.

TEXT BOOKS:

1. Digital Signal Processing –Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. Digital Signal Processing A Practical approach, Second Edition, Emmanuel C.I feachor, Barrie W Jervis, Pearson Publications. 2002.

REFERENCE BOOKS:

1. Digital Signal processors Architectures, implementations and Applications-Sen M.Kuo, Woon-Seng S.Gan, Pearson Publications, 2009.
2. Digital Signal Processors, Architecture, Programming and Applications –B. Venkata Ramani and M. Bhaskar,TMH, 2004.
3. Digital Signal Processing –Jonatham Stein, John Wiley, 2005.

Course Outcomes:

The student will be able to

1. use his knowledge to implement the applications of DSP processors in his life.
2. analyze the functioning of typical real time DSP systems.
3. implement various fixed point DSP processors and analyze the pipeline operation.
4. design memory and I/O interfacing of DSP processors.
5. implement the use of DSP algorithms and FFT.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414F) OPTICAL COMMUNICATION
(Professional Elective-III)

Course Objectives:
The Student will

1. initiate an expose to exciting area of optical communication.
2. learn the basic elements of optical fibre transmission link, fiber glass modes configurations and structures.
3. understand technical concepts which are at the core of design.
4. learn various optical sources, LED/LASER structures, receivers (PIN, APD), and noise performance.
5. model in such a way that it will be beneficial to an educator, researcher and technical trainer and industry persons those who are working in the area of optical communication.

UNIT-I: OVERVIEW OF OPTICAL FIBER COMMUNICATION
Historical development, Elements of an optical fiber transmission link, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, V number, Mode coupling, Step Index fibers, Graded Index fibers. Optical Fibers: fiber materials- Glass, Halide, Active glass, Chalgenide glass, Plastic, optical fibers. Photonic crystal.

UNIT-II: **SIGNAL DEGRADATION AND FIBER SPLICING IN OPTICAL FIBERS**
Introduction, Information capacity determination, Group delay, Attenuation, dispersion Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization mode dispersion Intra and Inter model dispersion, Pulse broadening. Fiber Splicing- Splicing techniques, splicing single mode fibers.
Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT-III: **SOURCES AND DETECTOR**
Sources-Introduction, LED's, double hetero junction structure LASER diodes, Source to fiber power launching - Output patterns, Power coupling, Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies.
Photo detectors- Physical principles of PIN and APD, Photo detector noise, Response time, double hetero junction structure, Photo diodes, comparison of photo detectors.

UNIT-IV: **OPTICAL RECEIVER**
Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources.

Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNTI-V: OPTICAL TRANSMISSION LINKS

Optical system design — Considerations, Component choice, Multiplexing. Point-to- point links, System considerations, Link power budget with examples. Overall fiber dispersion in Multi-mode and Single mode fibers, Rise time budget with examples.
Transmission distance, Line coding in Optical links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

Text Books:

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

References:

1. J Senior, “Optical communication, Principles and Practice”, Prentice Hall of India, 3rd Edition 2008.
2. J Gower, “Optical Communication System”, Prentice Hall of India, 2001.

Course Outcomes:

The Student will be able to

1. list the advantages of optical fiber communication systems over the conventional communication systems and discuss the characteristics of an optical signal by considering ray theory & wave guide theory approach.
2. formulate the attenuation mechanism in designing an optical fiber link.
3. analyze the equations that explain the modulation of an optical carrier with electrical data signals and apply these equations to determine the maximum modulation rate that can be attained.
4. solve non-linearity and dispersion affect the propagation of data signals in optical fiber and apply these solutions to analyze the maximum data rate and transmission distance of optical transmission links.
5. determine the various parameters of an optical receiver that affect bit-error-rate and eye diagrams and identify how an eye-diagram may be used in quantifying system performance.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414G) SATELLITE COMMUNICATIONS
(Professional Elective-IV)

Course Objectives:
The Student will
1. understand the basic concept in the field of satellite communication.
2. know how to place a satellite in an orbit.
3. calculate the link power budget.
4. get complete knowledge about the earth and space course systems.
5. gain knowledge about the satellite access schemes and mobile services provided.

Unit-I Introduction
Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.
Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbital determination, Launches and Launch vehicles, Orbital effects in communication systems performance.

Unit-II Satellite Subsystems
Attitude and Orbit control system, Telemetry, Tracking, Commanding and Monitoring, Power Systems.
Communication Subsystems, Satellite antennas, Equipment reliability and Space qualification.

Unit-III Multiple Access
Frequency Division Multiple Access (FDMA), Intermodulation, calculation of C/N. Time Division Multiple Access (TDMA), Frame structure, Examples.
Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

Unit-IV Satellite Link Design
Basic transmission theory, system noise temperature and G/T ratio, Design of down links, Uplink design, Design of satellite links for specified C/N, System design examples.
Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial Interface, Primary Power test methods.

Unit-V Low Earth Orbit and Geo-Stationary Satellite Systems

Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput considerations, Systems considerations, Operational NGSO Constellation Designs. Satellite Navigation and Global Positioning System: Radio and Satellite Navigation.

GPS Position Location principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:

1. Satellite Communications- Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering- Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCE BOOKS:

1. Satellite Communications: Design Principles- M. Richharia, B S publications, 2nd Edition, 2003.
2. Satellite Communication- D.C Agarwal, Khanna Publications, 5th Edition.
3. Fundamentals of Satellite Communications- K.N. Raja Rao, PHI, 2004.

Course Outcomes:

The student will be able to

1. define the dynamics of the satellite.
2. demonstrate communication satellite design.
3. discuss various multiple access techniques used in satellite communication.
4. differentiate how analog and digital technologies are used for satellite communication networks.
5. evaluate the design of Earth station and tracking of the satellites.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414H) EMBEDDED SYSTEM DESIGN

(Professional Elective-IV)

Course Objectives:

The Student will

1. understand the characteristics of embedded systems and application areas.
2. explain the core of embedded system and gain the knowledge of ASICs, PLDs and communication interfaces.
3. understand Embedded firmware, RTC and design approaches.
4. analyse RTOs based Embedded System Design and multiprocessing.
5. understand Task communication and task synchronization.

Unit-I

Introduction to Embedded Systems Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification.

Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Unit-II

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS).

Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

Unit-III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer.

Embedded Firmware Design Approaches and Development Languages.

Unit-IV

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Unit-V

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets.

Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

TEXT BOOKS:

1. Introduction to Embedded Systems- Shibu K.V, Mc Graw Hill.
2. Embedded Systems -Raj Kamal, TMH.

REFERENCE BOOKS:

1. Embedded System Design-Frank Vahid, Tony Givargis, John Wiley.
2. Embedded Systems –Lyla, Pearson, 2013.
3. An Embedded Software Primer-David E. Simon, Pearson Education.

Course Outcomes:

The student will be able to

1. define the characteristics of embedded systems, classification and application areas.
2. demonstrate core of embedded system, ASICs, PLDs and communication interfaces.
3. analyse Embedded firmware, RTC and design approaches.
4. design RTOs based Embedded System Design.
5. illustrate the concepts of Task communication and Task synchronization.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414I) NETWORK SECURITY AND CRYPTOGRAPHY
(Professional Elective-IV)

Course Objectives:

The Student will

1. Understand basics of Network Security by various security concepts.
2. Understand the concepts of various cryptographic algorithms.
3. Study about hash functions.
4. Gain knowledge on transport level security.
5. Gain knowledge on email security.

Unit-I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text.

Substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

Unit-II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

Unit-III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric and Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

Unit-IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS.

Secure Shell (SSH) Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security.

Unit-V

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations.

Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:

1. Cryptography and Network Security – Principles and Practice: William Stallings, Pearson Education, 6th Edition.
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition.

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.

Course Outcomes:

The student will be able to

1. describe network security and cryptography concepts.
2. obtain knowledge about symmetric and asymmetric key ciphers.
3. develop the various cryptographic algorithms.
4. evaluate the authentication and hash algorithms.
5. illustrate the basic concepts of transport level security and email security.

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UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414J) WIRELESS COMMUNICATIONS AND NETWORKS
(Professional Elective-IV)

Course Objectives:
The Student will

1. get an overview of Wireless Communication Networks area and its application in Communication engineering.
2. study propagation of electromagnetic signals in wireless channel.
3. understand different fading models.
4. learn basics of MIMO Communication.
5. study different wireless networks.

UNIT–I: Introduction to Wireless Communication Systems
Evolution of mobile radio communications, Examples of wireless communication systems, Paging systems, Cordless telephone systems, Comparison of various wireless systems.
Modern Wireless Communication Systems: Second generation cellular networks, Third generation wireless networks, Wireless in local loop, Wireless local area networks, Blue tooth and Personal area networks.
UNIT–II: Cellular System Design Fundamentals
Spectrum Allocation, Basic Cellular System, Frequency reuse, Channel assignment strategies, Handoff Strategies, Interference and system capacity, Trunking and grade off service, Improving coverage and capacity, cell splitting.
Multiple Access Techniques For Wireless Communication: Introduction to multiple access, FDMA, TDMA, Spread spectrum multiple access, Space division multiple access, Packet radio, Capacity of a cellular systems.
UNIT–III: Wireless Networking
Difference between wireless and fixed telephone networks, Development of wireless networks.
Fixed network transmission hierarchy, Traffic routing in wireless networks, Wireless data services, Common channel signalling.
UNIT–IV: Wireless WAN
Mechanism to support a mobile environment, Communication in the infrastructure, IS-95 CDMA forward channel, IS – 95 CDMA reverse channel, Packet and frame formats in IS – 95, IMT – 2000.
Forward channel in W-CDMA and CDMA 2000, Reverse channels in W-CDMA and CDMA-2000, GPRS and higher data rates, Short messaging service in GPRS mobile application protocols.
UNIT-V: Wireless LAN
Historical overviews of the LAN industry, Evolution of the WLAN industry, Wireless home networking, IEEE 802.11. The PHY Layer, MAC Layer, wireless ATM, HYPER LAN, HYPER

LAN–2.

Orthogonal Frequency Division Multiplexing: Basic Principles of Orthogonality, Single Versus Multi channel Systems, OFDM Block Diagram and its explanation, OFDM Signal mathematical representation.

Text Books:

1. Theodore S. Rappaport, Wireless Communications and Applictions, Pearson Education - 2003.
2. Upen Dalal, —Wireless Communications, Oxford University Press, 2010.

References:

1. P.Nicopolitidis, M.S.Obaidat, G.I. papadimitria, A.S. Pomportsis, —Wireless Networks, John Wiley & Sons, 2003.
2. X.Wang and H.V.Poor, —Wireless Communication Systems, Pearson education, 2004.

Course Outcomes:

The students will be able to

1. describe the wireless communication systems and understand cellular system design fundamentals.
2. discuss the concept of wireless networking.
3. acquire knowledge of propagation of Electromagnetic signals in wireless channel.
4. familiarize basic concepts of Wireless WAN and Wireless LAN.
5. illustrate basic concepts of OFDM.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414K) RADAR SYSTEMS
(Professional Elective-V)

Course Objectives:
The Student will

1. derive the basic radar equation and its dependence on various parameters .
2. study CW radar system and its application along with FMCW radar system for altimeter applications.
3. learn Doppler Effect and its applications with respect to pulsed Doppler radar.
4. understand moving target indicator and to study its application.
5. examine and understand the effect of noise on radar signal detection.

Unit-I Fundamentals of RADAR
Introduction, Maximum Unambiguous Range, Simple form of radar Equation, Radar block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise.
Modified Radar Range Equation, SNR, Envelope Detector False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

Unit-II CW and FM-CW Radar
Doppler Effect, CW Radar Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.
FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics, (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar**.** Illustrative Problems.

Unit-III MTI and Tracking Radar
Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters.
MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers**.**

Unit-IV Detection of Radar Signals in Noise

Introduction, Matched Filter Receiver Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Unit-V RADAR Receivers

Noise Figure and Noise Temperature, Displays- types, Duplexers, Branch type and Balanced type, Circulators as Duplexers.

Introduction to Phased Array Antennas- Basic Concepts, Radiation Pattern, Beam steering and Beam Width Changes, Applications, Advantages and limitations.

TEXT BOOKS:

1. Introduction to Radar Merill I. Skolnik, TMH Special.,systems Indian Edition,2nd 2007.
2. Introduction to Radar Merrill I. Skolnik, 3rd ed.,Systems TMH,2001.

REFERENCE BOOKS:

1. Radar Principles, Technology by Byron Edde, Pearson Applications Education, 2004.
2. Radar Principles - Peebles, Jr. P.Z Wiley, New York.

Course Outcomes:

The Student will be able to

1. understand the basic principle of RADAR System.
2. discuss the working principle of CW and Frequency Modulated Radar.
3. analyze the principle of each and every block of MTI and Pulse Doppler Radar and understand tracking radar principle.
4. calculate Noise Figure and Noise Temperature in Radar Receivers and can describe antennas used.
5. obtain knowledge about radar receivers.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414L) CODING THEORY AND TECHNIQUES
(Professional Elective-V)

Course Objectives:
The Student will

1. understand coding and discuss what is coding and why do we use it.
2. Study linear block codes for error detection and correction.
3. Study and understand application of cyclic codes and convolution codes.
4. understand the concept of turbo codes for forward error correction.
5. gain knowledge on space time codes and spatial multiplexing.

Unit-I Coding for Reliable Digital Transmission and storage
Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.
Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system.

Unit-II Cyclic Codes
Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding.
Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

Unit-III Convolutional Codes
Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes.
Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

Unit-IV Turbo Codes
LDPC Codes- Codes based on sparse graphs, Decoding for binary erasure channel, Log-likelihood algebra, Brief propagation, Product codes, Iterative decoding of product codes.
Concatenated convolutional codes- Parallel concatenation, The UMTS Turbo code, Serial concatenation, Parallel concatenation, Turbo decoding.

Unit-V Space-Time Codes

Introduction, Digital modulation schemes, Diversity, Orthogonal space- Time Block codes, Alamouti's schemes, Extension to more than Two Transmit Antennas, Simulation Results. Spatial Multiplexing : General Concept, Iterative APP Preprocessing and Per-layer Decoding, Linear Multilayer Detection, Original BLAST Detection, QL Decomposition and Interface Cancellation, Performance of Multi – Layer Detection Schemes, Unified Description by Linear Dispersion Codes.

TEXT BOOKS:

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J. Costello Jr, Prentice Hall, Inc.
2. Error Correcting Coding Theory-Man Young Rhee- 1989, McGraw-Hill.

REFERENCE BOOKS:

1. Error Correcting Coding Theory-Man Young Rhee-1989,McGraw – Hill Publishing.
2. Digital Communications-Fundamental and Application - Bernard Sklar, PE.
3. Digital Communications- John G. Proakis, 5th ed., 2008, TMH.
4. Introduction to Error Control Codes-Salvatore Gravano-oxford.
5. Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, Wiley India.
6. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, 2009, TMH.

Course Outcomes:

The student will be able to

1. apply linear block codes for error detection and correction.
2. use cyclic codes for error detection and correction.
3. perform convolution codes for performance analysis.
4. construct turbo codes for forward error correction.
5. discuss Space time codes and spatial multiplexing.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414M) TELEVISION ENGINEERING
(Professional Elective-V)

Course Objectives:
The Student will

1. gain comprehensive coverage of TV Systems with all the new developments in Television and Video Engineering.
2. study the analysis and synthesis of TV Pictures, Composite Video Signa.
3. study Receiver Picture tubes and Television Camera Tubes'
4. study the various Color Television systems with a greater emphasis on television standards.
5. study the advanced topics in digital television and High definition television.

Unit-I Introduction
TV transmitter and receivers, synchronization. Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal, TV standards. Camera tubes: image Orthicon, Plumbicon, vidicon, silicon Diode Array vidicon, Comparison of camera tubes, Monochrome TV camera.
TV Signal Transmission a**nd Propagation**: Picture Signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW,TV transmitter, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas.

Unit-II Monochrome TV Receiver
RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits, AGC, noise cancellation.
Video and inter carrier sound signal detection, vision IF subsystem of Black and White receivers, Receiver sound system: FM detection, FM Sound detectors, and typical applications.

Unit-III Sync Separation and Detection
TV Receiver Tuners, Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions. Sync Separation, AFC and Deflection Oscillators.
Synchronous separation, k noise in sync pulses, separation of frame and line sync pulses.
AFC, single ended AFC circuit, Deflection Oscillators, deflection drive ICs, Receiver Antennas, Picture Tubes.

Unit-IV Color Television
Colour signal generation, additive colour mixing, video signals for colours, colour difference signals, encoding, Perception of brightness and colours luminance signal,

Encoding of colour difference signals, formation of chrominance signals, color cameras, Colour picture tubes, colour specifications.

Color Signal Encoding and Decoding: NTSC colour system PAL colour system, PAL encoder, PAL-D Decoder, chrome signal amplifiers, separation of U and V signals, colour burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and colour killer circuits, U& V demodulators, colour signal mixing.

Unit-V Color Receiver

introduction to colour receiver, Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Colour, Phasors, synchronous demodulators, Sub carrier generation, raster circuits.

Introduction to Digital TV, Digital Satellite TV, Direct to Home Satellite TV, Digital TV Transmitter, Digital TV Receiver, Digital Terrestrial TV, LCD TV, LED TV, CCD Image Sensors, HDTV.

TEXT BOOKS:

1. Television and Video Engineering- A.M.Dhake, 2nd Edition.
2. Monochrome and Colour TV- R.R. Gulati, New Age International Publication, 2002.

REFERENCE BOOKS:

1. Colour Television Theory and Practice- S.P. Bali, TMH, 1994.
2. Basic Television and Video Systems-B.Grob and C.E. Hemadon, McGraw Hill, 1999.
3. Modern Television Practice – Principles, Technology and Service- R.R. Gallatin, New Age International Publication, 2002.

Course Outcomes:

The student will be able to

1. recognize the transmission of video signals and importance of television standards to effectively work with broadcasting applications.
2. understand different sections in monochrome TV receiver.
3. asses the traditional video formats and common modern digital formats.
4. analyze digital video transmission techniques based on applications.
5. describe principle and working of colour television and colour receiver with colour signal encoding and decoding.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

(E414N) DIGITAL IMAGE PROCESSING
(Professional Elective-V)

Course Objectives: The student will

1. understand fundamental concepts of digital image processing.
2. analyze images in frequency domain using various transforms.
3. evaluate the techniques for image enhancement and image Restoration.
4. learn the fundamental DIP algorithms and implementation.
5. gain experience in applying image processing algorithms to real problems.

Unit-I DIGITAL IMAGE FUNDAMENTALS: What is Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Elements of Visual Perception.
Point Spread Function (PSF), Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, Linear and Nonlinear Operations.

Unit-II IMAGE TRANSFORMS: Two-dimensional Orthogonal & Unitary Transforms, Properties of Unitary Transforms, Two Dimensional Discrete Fourier Transform.
Discrete Cosine Transform, Sine Transform, Hadamard Transform, Haar Transform, Slant Transform, KL transform.

Unit-III IMAGE ENHANCEMENT: Image enhancement in Spatial Domain, Some Basic Gray Level transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations.
Image Filters, Smoothing, Frequency Domain Filters in frequency domain, Sharpening, Homomorphic Filtering.

Unit-IV Model of Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise, Spatial Filtering.
Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant Degradations, Inverse Filtering, Minimum Mean Square Error (Weiner) Filtering.

Unit-V Color Fundamentals: Color Models, Pseudo Color Image Processing, Basics of Full Color Image Processing, Color Transformations.
Smoothing and Sharpening, Image Segmentation Based on Color, Noise in Color Images, Color Image Compression.

TEXT BOOKS:

1. "Digital Image Processing", Rafael C.Gonzalez, Richard E. Woods, etal , TMH, 2nd Edition.

REFERENCE BOOKS:

1. "Fundamentals of Digital Image Processing", Anil K. Jain, Pearson Education, 2001.
2. "Digital Image Processing and Analysis", B. Chanda and D. Dutta Majumdar, PHI, 2003.

Course Outcomes:

The Student will be able to:

1. discuss the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
2. analyze 2D Fourier transform concepts, including the 2D DFT and FFT, and their use in frequency domain filtering.
3. interpret the Human Visual System (HVS) and its affect on image perception and understanding.
4. describe the fundamental image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection.
5. analyze programming skills in digital image processing related problems.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - I Semester	**0**	**0-3-0**	**2**

(E4107) MICROWAVE ENGINEERING LAB

Course Objectives: The Student will

1. be provided with basic knowledge of Microwave components and equipment.
2. familiarize with the practical applications of Microwave kits.
3. understand various concepts and techniques of microwave components.
4. Study of microwave antennas.
5. practice measurement of microwave power and radiation pattern.

LIST OF EXPERIMENTS

1. Study of microwave bench (cables, connectors, Adapters, wave-guides, components & passive devices).
2. Measurement of gain and frequency characteristics of reflex klystron tube.
3. Gunn diode characteristics.
4. Determination of standing wave ratio (VSWR) and reflection coefficient.
5. Study of microwave tee's.
6. Attenuation measurement.
7. Determination of characteristics of isolator.
8. Determination of characteristics of circulator.
9. Characteristics of multihole directional coupler.
10. Measurement of wave impedance & wave length using slotted waveguide section
11. Study of propagation of microwaves using horn Antenna.
12. Measurement of microwave power using a thermistor mount/variable flap attenuator.
13. Measurement of radiation pattern of a test antenna.
14. Determination of unknown load impedance of transmission line using smith chart.

Equipment required for Laboratories:

1. Microwave Bench set up with Klystron Power Supply.
2. Microwave Bench set up with Gunn Power Supply.
3. Micro Ammeter.
4. VSWR meter.
5. Microwave Components.

Course Outcomes: The student will be able to

1. emphasize on sampling, modelling techniques, signal constellations.
2. use advanced test and measurement equipment to make meaningful comparisons between measured and theoretical results.
3. practice with microwave bench and analyze functionality of different components.
4. experiment various microwave antennas.
5. measure microwave power and radiation pattern.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - II Semester	**4**	**0-0-0**	**4**

(E424A) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Objectives:

The Student will

1. basic concepts and definition in measurement.
2. understand and learn the different principles and instruments adopted for measurement of current, voltage, power, energy etc.
3. study different methods available for measurement of passive elements like resistance, inductance & capacitance.
4. have to gain knowledge about AC and DC bridges, Oscilloscopes and transducers.
5. study the storage of digital signal and analyzers for analyzing digital signals.

UNIT - I:

Block Schematics of Measuring Systems, Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters.

Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments. Electronic Voltmeters, Multimeters, AC,DC Meters, Digital Voltmeters: Ramp Type, Staircase Ramp, Dual Slope Integrating type, Successive Approximation Type,Autoranging,$3^{1/2}$,$3^{3/4}$ Digit Display, Pico ammeter, High Resistance Measurements, Low current Ammeter, Applications.

UNIT - II:

Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator, Video Signal Generators, and Specifications.

Signal Analyzers, AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillaors.

UNIT -III:

DC and AC Bridges: Wheat Stone Bridge, Kelvin Bridge, AC Bridges, Maxwell, Hay, Schering, Wien, Anderson Bridges.

Resonance Bridge, Similar Angle Bridge ,Wagner's ground connection, Twin T, Bridged T Networks, Detectors.

UNIT - IV:

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications, Specifications.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs, Frequency Measurement, Period Measurement, Errors in time/Frequency Measurements, universal counters, Extension of range; Recorders: Strip chart, X-Y, oscillographic recorders.

UNIT -V:

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.

TEXT BOOKS:

1. Electronic Measurements and Instrumentations by K. Lal Kishore, Pearson Education - 2010.
2. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition 2004.

REFERENCE BOOKS:

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Uiv. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI, 5th Edition, 2003.
3. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
4. Industrial Instrumentation: T. R. Padmanabham Spiriger 2009.

Course Outcomes:

The Student will be able to

1. list the various measurement techniques available and analyze the basic working of instruments used for measurement.
2. compute the errors in measurements and their rectification.
3. analyse the working of AC and DC bridges.
4. illustrate the basic principle and working of Oscilloscopes.
5. distinguish different types of transducers.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. ECE	**L**	**T-P-D**	**C**
IV Year - II Semester	**0**	**0-3-0**	**2**

(E4210) VLSI LAB

Course Objectives:
The Student will

1. learn the logic design of Digital circuits.
2. learn implementation of designs using Hardware description language.
3. learn the concept of timing simulation.
4. learn implementation of RTL codes using various simulation tools.
5. learn CAD tools for design and implementation using FPGA devices.

• Note: Minimum of 10 programs from Part –I and 2 programs from Part -II are to be conducted.

Design and implementation of the following CMOS digital/analog circuits using Cadence / Mentor Graphics / Synopsys / Equivalent CAD tools. The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification.

Part –I: VLSI Front End Design programs:

Programming can be done using any complier, and obtain the simulation, synthesis, place and route and implement into FPGA/CPLD boards. The performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates.
2. Design and Simulation of adder.
3. Design of encoders and decoders.
4. Design of multiplexer and de-multiplexer.
5. Design of code converters and comparators.
6. Design of flip flops: SR, D, JK, T.
7. Design of register using latches and flip flops.
8. Design of shift register of serial- in serial –out, serial in parallel out, parallel in serial out and parallel in parallel out.
9. Design of synchronous and asynchronous counter.
10. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines).

Part –II: VLSI Back End Design programs:

Design and implementation of the following CMOS digital/analog circuits using Cadence tools. Layout, physical verification (DRC, LVS) DC/transient analysis, for complex design of the following:

11. Introduction to layout design rules.

12. Layout, physical verification, Layout, for complex design of the following:
    - Basic logic gates
    - CMOS inverter
    - CMOS NOR/NAND gates
    - CMOS XOR
    - CMOS MUX gates

Course Outcomes:

The student will be able to

1. write HDL codes for all digital designs and implement using simulation tools.
2. obtain timing simulation and calculate performance analysis.
3. synthesize combinational and sequential designs.
4. implement physical design in FPGA devices.
5. practice the test pattern generation for Digital circuits.

Open Elective - I

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

DISASTER MANAGEMENT
(Open Elective – I)

Course Objectives:

The students will :

1. To provide basic conceptual understanding the difference between the hazard and a disaster.
2. To gain knowledge about the various disasters and their impacts.
3. To provide basic understanding about the hazard and vulnerability profile of India.
4. To have conceptual understanding about the disaster management phases.
5. To gain approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

UNIT - I:

Concept of Disaster, Different approaches, Concept of Risk, Levels of Disasters, Disaster Phenomena and Events (Global, national and regional) ,Hazards and Vulnerability, Natural and man-made hazards, response time, frequency and forewarning levels of different hazards, Characteristics and damage potential or natural hazards, hazard assessment ,Dimensions of vulnerability factors, vulnerability assessment Vulnerability and disaster risk ,Vulnerabilities to flood and earthquake hazards.

UNIT II:

Disaster Management Mechanism, Concepts of risk management and crisis managements. Disaster Management Cycle, Response and Recovery Development, Prevention, Mitigation and Preparedness ,Planning for Relief.

UNIT - III:

Capacity Building: Concept, Structural and Non-structural Measures ,Capacity Assessment; Strengthening Capacity for Risk reduction ,Counter-Disaster Resources and their utility in Disaster Management ,Legislative Support at the state and national levels.

UNIT - IV:

Coping with Disaster, Coping Strategies; alternative adjustment processes, Changing Concepts of disaster management ,Industrial Safety Plan; Safety norms and survival kits, Mass media and disaster management.

UNIT - V:

Planning for disaster management, Strategies for disaster management planning, Steps for formulating a disaster risk reduction plan, Disaster management Act and Policy in India. Organizational structure for disaster management in India, Preparation of state and district disaster management plans .

TEXT BOOKS:

1. Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.
2. Carter, W.N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.

REFERENCES:

1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner's Handbook, ADPC, Bangkok, 2004.
2. Goudie, A. Geomorphological Techniques, Unwin Hyman, London 1990.
3. Goswami, S.C Remote Sensing Application in North East India, Purbanchal Prakesh, Guwahati, 1997.

Course Outcomes:

The Students will be to

1. acquired knowledge on various types of disasters and hazards.
2. distinguish between the hazard and a disaster can be analyzed.
3. acquired knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. ability to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
5. develop ability to respond to different disasters.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

Elements of Civil Engineering
(Open Elective-I)

Course Objectives:

The students will:

1. To understand different methods of surveying for various applications.
2. To familiarize with various types of building materials.
3. To understand transportation and traffic management.
4. The knowledge of water sources, supply& its treatment.
5. Study about Highway development in India, Necessity for Highway planning, different road development plans..

UNIT - I:

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT II:

Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying –introduction, chain and compass traversing, closing error and adjustments. Levelling– introduction, types of levelling instruments, dumpy level, adjustment of level, levelling staff.

UNIT - III:

Building Materials and Construction

Materials: Introduction to construction materials like ferrous and non ferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. Construction: Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT - IV:

Fire and Earthquake Protection in Building Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials, fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT - V:

Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

Highway Engineering:

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

TEXT BOOKS:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

Course Outcomes:

Students will be able to

1. Carry out simple land survey and prepare maps showing the existing details.
2. Find out area of irregular shaped plane areas.
3. Understand building plan, elevation and section.
4. Get acquainted with construction materials and transportation systems.
5. Understand transportation and traffic problems.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year – I Semester	**3**	**0-0-0**	**3**

Network Analysis and Synthesis
(Open Elective - I)

UNIT I:
Concept of generalized frequency, circuit representation and their response in terms of generalized frequency.

UNIT II:
Fourier transforms and series, Laplace transform, its properties, and Z transforms, its properties and applications, Concept of one port, two-port networks, characteristics and parameters.

UNIT III:
Generalized network functions (Driving point and Transfer), concepts of poles and zeros, determination of free and forced response from poles and zeros, concept of minimum phase networks, analysis of ladder, lattice, T and bridged-T networks.

UNIT IV:
Introduction to state-space representation of networks and their analysis. Concept of filtering, filter types and characteristics, classical design of T and PI passive filters, frequency transformations. Introduction to active filters, active filter specifications, design of first and second order RC –active filters, maximally flat and equi-ripple filter characteristics, implementation using passive elements and op-amps.

UNIT V:
Network synthesis- Synthesis problem formulation, properties of positive real functions, Hurwitz polynomials, properties of RC, LC and RL driving point functions, Foster and Cauer synthesis of LC and RC circuits.

Text Books:

1. Temes & LaPatra – Introduction to circuit Synthesis & Design, McGraw Hill.
2. V. Valkenberg – Modern Network Synthesis, PHI.

Reference Books:

1. Weinberg – Network Analysis & Synthesis, McGraw Hill.
2. Peikari – Fundamentals of Network Analysis & Synthesis, Wiley.
3. V. Atre-- Network Theory and Filter design, TMH.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year – I Semester	**3**	**0-0-0**	**3**

Measurements and Instruments

(Open Elective - I)

UNIT - I:

Philosophy Of Measurement- Methods of Measurement, Measurement System, Classification of instrument system, Characteristics of instruments & measurement system, Errors in measurement & its analysis, Standards.

Analog Measurement of Electrical Quantities –Electrodynamics , Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters , Electrodynamics' Wattmeter, Three Phase Wattmeter, Power in three phase system , errors & remedies in wattmeter and energy meter. Instrument Transformer and their applications in the extension of instrument range, Introduction to measurement of speed , frequency and power factor.

UNIT - II:

Measurement of Parameters- Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q Meter.

AC Potentiometer- Polar type & Co-ordinate type AC potentiometers , application of AC Potentiometers in electrical measurement.

UNIT - III:

Magnetic Measurement- Ballistic Galvanometer, flux meter , determination of hysteresis loop, measurement of iron losses

UNIT - IV:

Digital Measurement of Electrical Quantities- Concept of digital measurement, block diagram Study of digital voltmeter, frequency meter Power Analyzer and Harmonics Analyzer; Electronic Multimeter.

UNIT - V:

Cathode Ray Oscilloscope - Basic CRO circuit (Block Diagram),Cathode ray tube (CRT) & its components , application of CRO in measurement ,Lissajous Pattern.; Dual Trace & Dua Beam Oscilloscopes.

Text Books:

1. E.W. Golding & F.C. Widdis, - Electrical Measurement &Measuring Instrument‖, A.H. Wheeler& Co. India.
2. A.K. Sawhney, -Electrical & Electronic Measurement & Instrument‖, Dhanpat Rai & Sons

Reference Books:

1. Forest K. Harries,—Electrical Measurement, Willey Eastern Pvt. Ltd. India .
2. M.B. Stout ,—Basic Electrical Measurement‖ Prentice hall of India.
3. W.D. Cooper,‖ Electronic Instrument & Measurement Technique — Prentice Hall International.
4. Rajendra Prashad ,—Electrical Measurement &Measuring Instrument‖ Khanna Publisher.
5. J.B. Gupta, -Electrical Measurements and Measuring Instruments‖, S.K. Kataria & Sons.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

AUTOMOBILE ENGINEERING

(OPEN ELECTIVE-I)

UNIT – I: Introduction : Components of four wheeler automobile – chassis and body – power unit – power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarburization, Nitriding of crank shaft. Emission from Automobiles – Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.

UNIT – II: Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – carburetor – types – air filters – petrol injection. Electronic injection system
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.

UNIT – III: Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.
Ignition System : Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

UNIT – IV: Electrical System : Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc
Transmission System : Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box , over drive torque converter.Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles– types – wheels and tyres.

UNIT – V: Steering System : Steering geometry – camber, castor, king pin rake, combined angle toe in, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.
Suspension System : Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.
Braking System : Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXT BOOKS :

1. Automobile Engineering ,Vol. 1 & Vol. 2/ Kripal Singh
2. Automobile Engineering , Vol. 1 & Vol. 2 ,by K.M Gupta,Umesh publication
3. Automobile Engineering - K.K.Ramalingam –scitech lab

REFERENCE BOOKS :

1. A System approach to Automotive Technology by Jack Erjavec YesDee publishing pvt Ltd.
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Alternative fuels of Automobiles by P.RamiReddy, Frontline publications.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

ENGINEERING MATERIALS AND FABRICATION PROCESSES

(OPEN ELECTIVE – I)

UNIT-I: FERROUS ALLOYS: Introduction, Designations and classifications for steels, Simple Heat Treatments, Effect of Alloying Elements.

NONFERROUS ALLOYS: Introduction, properties and applications, Aluminum Alloys, Magnesium Alloys, Copper Alloys and Titanium Alloys.

CERAMIC MATERIALS: Introduction, Properties and Applications of Ceramics, Glasses and Refractories

POLYMERS: Introduction, Classification of Polymers, Polymerization, Degree of Polymerization, Typical Thermoplastics and Thermosets.

COMPOSITES: Introduction, Classification, Properties and Applications of Polymer matrix, Metal Matrix Ceramic Matrix and Laminar composites.

UNIT-II: Casting : Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.

Methods of Melting - Crucible melting and cupola operation – Defects in castings;

Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.

UNIT-III: Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

Inert Gas Welding _ TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT-IV: Hot working, cold working, strain hardening, recovery, re-crystallization and grain growth. Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT-V: Extrusion of Metals : Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers : Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

TEXT BOOKS:

1. Donald R. Askland, Pradeep P. Phule, The Science and Engineering of Materials (4th Edition), Thomson Publishers, 2003.
2. William D. Callister Introduction to Material Science and Engineering, John Wiley and Sons, 2007.
3. W.F.Smith, Principles of Materials Science and Engineering, Mc Graw Hill, New York, 1994.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

Principles of Electronic Communications
(OPEN ELECTIVE – I)

Course objectives: The Student will

1. gain knowledge about modulation and various analog modulation schemes.
2. have a broad understanding of Pulse modulation schemes.
3. obtain knowledge on Digital modulation techniques.
4. illustrate the wireless networking concepts.
5. understand the principle of cellular mobile radio systems.

Unit I: Introduction
Block diagram of Electrical communication system, Radio communication, Types of communications: Analog, pulse and digital. Analog Modulation: Need for modulation, Types of Analog modulation, Amplitude Modulation.
Angle Modulation: Frequency & Phase modulations. Generation and Demodulation techniques. Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

Unit II: Pulse Modulations
Sampling, Nyquist rate of sampling, sampling theorem for Band limited signals, PAM, regeneration of base band signal.
PWM and PPM, Time Divison Multiplexing, Frequency Divison Multiplexing, Asynchronous Multiplexing.

Unit III: Digital Communication
Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.
Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, offset and non-offset QPSK, coherent and incoherent reception, Modems.

Unit IV: Introduction to Wireless Networking
Introduction, Difference between wireless and fixed telephone networks,
Development of wireless networks, Traffic routing in wireless networks.

Unit V: Cellular Mobile Radio Systems
Introduction to Cellular Mobile System, concept of frequency reuse, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems, Cell splitting.
Handoffs and Dropped Calls Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem

handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.

TEXT BOOKS:

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002,PHI.

REFERENCE BOOKS:

1. Wireless Communication and Networking – William Stallings, 2003, PHI.
2. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
3. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2ndEd. 2004.

Course outcomes: The Student will be able to

1. acquire knowledge about analog and angle modulation techniques.
2. illustrate the concepts of Pulse modulation schemes.
3. obtain knowledge on Digital modulation techniques.
4. describe the wireless networking concepts.
5. understand the basics of cellular mobile radio systems and types of handoff.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year I Semester	**3**	**0-0-0**	**3**

MATLAB PROGRAMMING

(Open Elective-I)

Course objectives: The Student will

1. gain knowledge in exploring MATLAB software.
2. be able to find approach for solving Engineering problems using simulation tools.
3. be prepared to use MATLAB in their project works.
4. gain a foundation in use of this software for real time applications.
5. practice numerical methods, simulations and understand MATLAB programming.

UNIT-I: MATLAB basics, The MATLAB Environment, Basic computer programming, Variables and constants, operators and simple calculations, Formulas and functions, MATLAB toolboxes, Exercises.

UNIT-II: Matricers and vectors, Matrix and linear algebra review, vectors and matrices in MATLAB.

Matrix operations and function in MATLAB, Exercises**.**

UNIT-III: Computer programming, Algorithms and structures, MATLAB scripts and functions (m-files).

Simple sequential algorithms, control structures (if…then, loop), Exercises.

UNIT-IV: MATLAB programming, Reading and writing data, file handling, personalized functions.

Toolbox structure, MATLAB graphic functions, Exercises.

UNIT-V: Numerical simulations-Numerical methods and simulations, Random number generation, Montecarlo methods statistics Toolbox, User‘s Guide: Random Number and Generation Functions).

Hands-on session

Interactive hands-on-session where the whole class will develop one or more MATLAB scripts that solve an assigned problem.

TEXT BOOK:

1. MATLAB Programming by Y.Kirani Singh, B.B Chowdari , PHI publications, 2007 edition.
2. MATLAB And Its Applications In Engineering By Rajkumar Bansal , Ashok Kumar Goel, Manoj Kumar Sharma, Pearson Education Publications, version 7.5.

REFERENCE BOOKS:

1. Getting Started With MATLAB By Rudrapratap, Oxford Publication, 2002 Edition.

Course outcomes: The Student will be able to

1. develop programming and simulation for engineering problems.
2. estimate importance of software’s in research by simulation work.
3. prepare basic mathematical, electrical, electronic problems in MATLAB.
4. synthesis basic electronic circuits in simulink.
5. interpret programming files with GUI Simulink.

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UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year I Semester	**3**	**0-0-0**	**3**

DATA STRUCTURES THROUGH C
(Open Elective-I)

Course Objectives:
The Student will:

1. Review the basic concepts of data structures and algorithms.
2. Classify basic concepts of stacks, queues.
3. Understanding searching and sorting techniques.
4. Classify basic concepts about stacks, queues ,lists ,trees and graphs.
5. Know step by step approach in solving problems with the help of fundamental data structures.

UNIT - I:

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, Doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT - II:

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation. Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue

UNIT - III:

Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

UNIT - IV:

Graphs: Terminology, sequential and linked representation, graph traversals : Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

UNIT - V:

Searching and Sorting – Big O Notation, Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, Searching-linear and binary search methods.

Text Books:

1. **Data Structures Using C** Reema Thareja, Oxford University Press, 2011 Learning.
2. **Data Structures Using C** (Paperback) by Aaron M. Tenenbaum

Reference Books:

1. **C Programming & Data Structures**, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage
2. **C& Data structures** – P. Padmanabham, Third Edition, B.S. Publications.
3. **Data Structures using C** – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein,Pearson Education

Course Outcomes:

The student will be able to:

1. Analyze algorithms and algorithm correctness.
2. Apply searching and sorting techniques.
3. Practice stack, queue and linked list operation.
4. Relate tree and graphs concepts.
5. Relates graphs concepts with traversals.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year I Semester	**3**	**0-0-0**	**3**

PYTHON PROGRAMMING
(Open Elective-I)

Course objectives:
Student will:

1. Learn how to design and program Python applications.
2. Learn how to use lists, tuples, and dictionaries in Python programs.
3. Learn how to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Learn how to build and package Python modules for reusability, design object oriented programs with Python classes,use class inheritance in Python for reusability.
5. Learn how to use exception handling in Python applications for error handling

UNIT - I:

Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

UNIT - II:

Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

UNIT - III:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, attributes, instances as arguments, instances as return values, objects are mutable, copying; classes and functions: pure function, modifiers; Exceptions: raising exceptions, handling exceptions, exception hierarchy.

UNIT - IV:

Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism. Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem, different sets of arguments.

UNIT - V:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;
Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Text Books:

1. **Python 3 Object Oriented Programming,** Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language- Second Edition, Mark Summerfiels, Addison-Wesley 2010.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

Course outcomes:

Students will abel to:

1. Describe to design and program Python applications.
2. Analyze and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components ,decision statements, pass arguments in Python.
4. Apply decision for building and package Python modules for reusability, design object-oriented programs with Python classes, use class inheritance in Python for reusability.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

E-DISASTER MANAGEMENT

(OPEN ELECTIVE-I**)**

Course Objectives

At the end of the course, students will :

1. Explain various disasters and their impacts.
2. Describe storage networking technologies such as FC-SAN, NAS, IP-SAN and data archival solution – CAS.
3. Identify different storage virtualization technologies and their benefits.
4. Understand and articulate business continuity solutions including, backup technologies, and local and remote replication.
5. Identify parameters of managing and monitoring storage infrastructure and describe common storage management activities and solutions.

UNIT-I:

Introduction to Disasters; Examples; Information Availability, Causes of Information Unavailability, Measuring Information Availability.

Consequences of Downtime; Failure Analysis, Single Point of Failure, Fault Tolerance, Multi pathing Software.

UNIT-II:

Backup and Recovery: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations.

Backup Methods, Backup Process Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNIT-III:

Local Replication: Source and Target, Uses of Local Replica, Data Consistency, Local Replication Technologies, Restore and Restart Considerations Creating Multiple Replicas, Management. Interface.

Remote Replication: Modes of Remote Replication, Remote Replication Technologies Network Infrastructure.

UNIT-IV:

Securing the Storage Infrastructure, Storage Security Framework, Risk Triad, Assets, Threats, Vulnerability. Storage Security Domains, Securing the Application Access Domain. Securing the Management Access Domain, Securing Backup, Recovery, and Archive (BURA), Security Implementations in Storage Networking SAN , NAS, IP SAN.

UNIT-V:

Monitoring the Storage Infrastructure: Parameters Monitored, Components Monitored, Monitoring Examples, Alerts, Storage Management Activities, Availability management, Capacity management, Performance management, Security Management.

Reporting, Storage Management Examples, Storage Infrastructure Management Challenges, Developing an Ideal, Solution, Storage Management Initiative, Enterprise Management Platforms.

TEXT BOOK:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information**,** Ganesh Rajaratnam**,** EMC Education Services. Wiley Publications.
2. Executive Guide to Preventing Information Technology Disasters By Richard Ennals. Springer.

REFERENCE BOOKS:

1. Information Management & Computer Security, Port Elizabeth Technikon, Port Elizabeth, MCB UPLtd.
2. Information Security Management Systems, GodesbergerAllee,BSI.

Course Outcomes

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

1. Apply important storage technologies and their features such as availability,replication, scalability andperformance.
2. Show employs project teams to install, administer and upgrade popularstorage solutions.
3. Illustrate virtual servers and storage between remotelocations.
4. Use the knowledge of Disaster ManagementPhases.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

HUMAN COMPUTER INTERACTION

(OPEN ELECTIVE-I)

Course Objectives

At the end of the course , students will :

1. Demonstrate an understanding of guidelines, principles, and theoriesinfluencing human computer interaction.
2. Recognize how a computer system may be modified to include human diversity.
3. Select an effective style for a specific application.
4. Design mock ups and carry out user and expert evaluation of interfaces

UNIT I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III

Screen Designing: - Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls Components – text and messages, Icons and increases – Multimedia,
colors, uses problems, choosing colors.

UNIT V

Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOK:

1. The essential guide to user interface design, Wilbert O Galitz, WileyDreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson EducationAsia

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, RussellBealg,PearsonEducation
2. Interaction Design Prece, Rogers, Sharps. WileyDreamtech.
3. User Interface Design, Soren Lauesen , PearsonEducation.
4. Human –Computer Interaction,D.R.Olsen,Cengage Learning.

Course Outcomes

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

1. Explain the human, Computer components functions regarding interaction with computer
2. Demonstrate Understanding of Interaction between the human and computer Components.
3. Use Paradigms, HCI in the software process.
4. Implement Interaction design basics**.**

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	L	T-P-D	C
III Year - I Semester	3	0-0-0	3

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS

(OPEN ELECTIVE-I)

Course Objectives:
At the end of the course, students will learn:

1. Study the Architecture of 8085&8086 microprocessor
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. Study the Architecture of 8051 microcontroller
4. Make the interfacing in between microprocessor and various peripherals.
5. Know basic feature of 8051 and AVR controller.

UNIT–I:

8086 Architecture:8086 Architecture Functional diagrams, Register organization, memory segmentation, programming model, memory addresses, physical memory organization, architecture of 8086,signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

UNIT–II:

Instruction set and assembly language programming of 8086: Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT–III:

I/O Interface: 8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.
Interfacing with advanced devices: memory interfacing to 8086, interrupt structure of 8086, vector interrupt table, interrupt service routine.
Communication interface: serial communication standards, serial data transfer schemes, 8251 USART architecture and interfacing.

UNIT–IV:

Introduction to Microcontrollers: overview of 8051 microcontroller, architecture, I/O ports, memory organization, addressing modes and instruction set of 8051, simple programs.

UNIT-V:

8051 Real Time control: programming time interrupts, programming external hardware interrupts, Programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1. D.V.Hall, Microprocessors and interfacing,TMGH,2nd Edition 2006.
2. Kenneth.J.Ayala, The8051Microcontroler,3rdEd., C engage Learning.

References:

1. Advanced Microprocessors and Peripherals-A. K. Rayand K.M Bhurchandi, TMH, 2nd Edition 2006.
2. The 8051Microcontrollers.Architecture and programming and applications-K.Uma Rao, Andhe Pallavi,Pearson, 2009.
3. Microcomputer system 8086/8088 family architecture. Programming and design-Du and GA Gibson, PHI 2nd Edition.

Course Outcomes:

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

1. Design and implement programs on 8085microprocessors.
2. Design and implement programs on 8086microprocessors.
3. Design interfacing circuits with 8086.
4. Design and implement 8051 microcontroller based systems
5. Understand the concepts related to I/O and memory interfacing

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**0-0-0**	**3**

INTERNET OF THINGS
(OPEN ELECTIVE – I)

Course Objectives:

At the end of the course, students will learn:

1. Explore the interconnection and integration of the physical world and the cyberspace.
2. Able to design and develop IOT Device.
3. Explore the terminology, technology and its applications
4. Understand the concept of M2M (machine to machine) with necessary protocols.
5. To introduce the Python Scripting Language which is used in many IoT devices

UNIT–I:

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT–II:

Domain Specific IoT – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

IoT and M2M –Difference between IoT and M2M, SDN, NFV, Difference between SDN and NFV.

UNIT–III:

Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT–IV:

Network & Communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

UNIT-V:

Challenges in IoT

Design challenges, Development challenges, Security challenges, other challenges

Domain specific applications of IoT

Home automation, Industry applications, Surveillance applications, Other IoT applications

Text Books:

1. Internet of Things – A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

Course Outcomes:

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

1. Understand the application areas of IOT
2. Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
3. Building blocks of Internet of Things and characteristics.
4. Design and implementation/modification of methods involved in IoT.
5. Describe what IoT is and the skill sets needed to be a network analysis.

Open Elective - II

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

ESTIMATION, QUANTITY SURVEY & VALUATION
(Open Elective-II)

Course Objective

The main objective of the course is to

1. Understand how to estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project
2. Estimate the detailed quantities of various items of work and their rates in building projects.
3. Estimate the quantities of works and evaluate cost of project.
4. Understand and apply the concept of Valuation for Properties
5. Understand, Apply and Create the Tender and Contract document.

UNIT - I:

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating

UNIT II:

Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT - III:

Earthwork for roads and canals.

UNIT - IV:

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT - V:

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standard specifications for different items of building construction.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

WASTE MANAGEMENT
(Open Elective-II)

Course Objectives:

1. To learn about Solid Waste management
2. To describe the collection, treatment and disposal methods of Solid waste

UNIT - I:

Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics-Problems due to improper disposal of solid waste.

UNIT II:

Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT - III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid Waste-Processing and segregation of the solid waste- various methods of material segregation.

Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition methods of composting-advantages of composting- Incineration: definition methods of incineration advantages and disadvantages of incineration.

UNIT - IV: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification Design and Operation of landfills, Land Farming, Deep well injection.

UNIT - V: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Reference Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

Course Outcomes:

Students will be able to

1. Identify the types and sources of solid waste, and its characteristics.
2. Employ the treatment and disposal methods of solid waste.
3. Apply the concepts of solid waste management.

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B.Tech.	**L**	**T-P-D**	**C**
III Year – II Semester	**3**	**0-0-0**	**3**

NON-CONVENTIONAL ENERGY SOURCES AND APPLICATIONS

(Open Elective - II)

UNIT-I:

Introduction: Limitations of conventional energy sources, need and growth of alternate energy sources, basic schemes and applications of direct energy conversion.

MHD Generators: Basic principles and Hall Effect, generator and motor effect, different types of MHD generators, conversion effectiveness. Practical MHD generators, applications and economic aspects.

UNIT-II:

Solar Energy: Photovoltaic effect, characteristics of photovoltaic cells, conversion efficiency, solar batteries and applications. Solar energy in India, solar collectors, solar furnaces & applications.

UNIT-III:

Thermo-electric Generators: See back effect, peltier effect, Thomson effect, thermoelectric convertors, brief description of the construction of thermoelectric generators, applications and economic aspects.

Fuel Cells: Principle of action, gibbs free energy, general description of fuel cells, types, construction, operational characteristics and applications.

UNIT-IV:

Miscellaneous Sources: Geothermal system, characteristics of geothermal resources, choice of generators, electric equipment and precautions. Low head hydro plants, definition of lowhead hydro power, choice of site and turbines. Tidal energy, idea of tidal energy, tidal electric generator, limitations.

UNIT-V:

8051 Real Time control:

Programming time interrupts, programming external hardware interrupts, and programming the serial communication interrupts, programming 8051 Timers and counters.

Text Books:

1 D.S.Chauhan, „Non Conventional Energy Resources" New Age Publication

2. G.D. Rai, „Non-conventional energy sources", Khanna Publishers

Reference Books:

1. B.H.Khan, „Non Conventional Energy Resources" TMH.
2. H.P.Garg and Jai Prakash, „Solar Energy Fundamentals and Applications", TMH

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B.Tech.	**L**	**T-P-D**	**C**
III Year – II Semester	**3**	**0-0-0**	**3**

Electrical Technology
(Open Elective - II)

UNIT - I:
D.C Generators and DC Motors:
Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators, DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT - II:
Transformers & Performance:
Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit, Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT - III:
Three Phase Induction Motor:
Principle of operation of three-phase induction motors –Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT - IV:
Alternators:
Alternators – Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT - V:
Special Motors & Electrical Instruments:
Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics, Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters).

Text Books:

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering - T.K. Nagasarkar and M. S. Sukhija, Oxford University Press, 2005

Reference Books:

1. Principles of Electrical Engineering - V.K Mehta, S. Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarath and D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

OPERATIONS RESEARCH
(Open Elective-II)

UNIT I: Introduction - Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.
ALLOCATION: Linear Programming Problem - Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two–phase method, Big-M method; Duality Principle.

UNIT II: TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.
Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem.

UNIT III: SEQUENCING – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines
REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely- Group Replacement.
UNIT IV: THEORY OF GAMES: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games –m x 2 & 2 x n games - graphical method – m x n games - dominance principle.
INVENTORY: Introduction – Single item, Deterministic models – Types - Purchase inventory models with one price break and multiple price breaks – inventory models with and without shortage cost. Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

UNIT V: WAITING LINES: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.
DYNAMIC PROGRAMMING:
Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming- shortest path problem – linear programming problem.
SIMULATION:- Definition – types of simulation models- applications ,advantages and disadvantage. Brief introduction of simulation languages – inventory and queuing problems using random numbers

TEXT BOOKS :

1. Operation Research /J.K.Sharma/MacMilan.
2. Operations Research / ACS Kumar/ Yesdee

REFERENCES:

1. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspan and Lawrence Friedman
2. Operations Research /A.M.Natarajan, P. Balasubramaniam, A. Tamilarasi/Pearson Education
3. Operations Research / Wagner/ PHI Publications.
4. Introduction to O.R/Hillier & Libermann (TMH).

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

NANOTECHNOLOGY

(Open Elective **–II)**

UNIT I: Introduction to nanotechnology: Importance of nano scale, Nanostructure types, electronic, magnetic, optical Properties of Nano materials, top-down and bottom- up approach to nanostructures.

Quantum Mechanical phenomenon in nanostructures: Quantum confinement of electrons in semiconductor Nano structures, one dimensional confinement (Quantum wires), two dimensional confinements (Quantum Wells), three dimensional confinements (Quantum dots).

UNIT II: Carbon Nano Structures: Carbon nano tubes (CNTs), Fullerenes, C60, C80 and C240 Nanostructures, Properties (mechanical, optical and electrical) and applications.

Fabrication of Nano materials: Physical Methods: Inert gas condensation, Arc discharge, RF plasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser pyrolysis, Molecular beam epitaxy, Chemical vapour deposition method.

UNIT III: Nano scale characterization techniques: Scanning probe techniques (AFM, MFM, STM, SEM, TEM), XRD

Nano devices and Nano medicine: Lab on chip for bioanalysis, Core/shell Nanoparticles in drug delivery systems (site specific and targeted drug delivery), cancer treatment, and bone tissue treatment.

UNIT IV: Nano and molecular electronics: Resonant-Tunneling structures, single electron tunneling, Single Electron transistors, coulomb blockade, giant magneto resistance, tunneling magneto resistance.

UNIT V: Nanolithography and Nano manipulation: e-beam lithography and SEM based nanolithography and nano manipulation, Ion beam lithography, oxidation and metallization. Mask and its application. Deep UV lithography, X-ray based lithography.

TEXT BOOKS :

1. Introduction to Nanotechnology: Charles.P.Pode, Springer Publications, 2008.
2. Springer Handbook of Nanotechnology: Bharat Bhusan, Springer Publications, 2010.

REFERENCES:

1. Principles of Nanotechnology: Phani Kumar, Scitech Publications.
2. Transport in Nano structures: David Ferry, Cambridge University Press 2000
3. Nano-biotechnology; C.M. Niemeyer, C.A. Mirkin, Wiley Publications, 2006.

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B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

APPLICATIONS OF MICROPROCESSORS AND CONTROLLERS

(Open elective-II)

Course Objectives: The Student will

1. understand the control systems and types of control systems
2. understand the basic 16-bit microprocessor architecture and its functionalities and develop microprocessor basic programs for various applications.
3. develop the microcontroller based programs for various applications.
4. understand basic feature of 8051 controller.
5. understand the basics of PLC and SCADA and their functionalities.

Unit I: Introduction: Control Systems Components Role of control system in instrumentation, Open and close loop control system, types and Block diagram, Servomechanism and regulators with suitable examples, Basic control actions - On-off, Proportional, Derivative, Integral control, Proportional derivative (PD).

Proportional integral (PI), P Proportional integral and Derivative (PID) control, Basic control system components –AC/ DC Servo motor, AC/ DC Tacho generator, Stepper motor and Synchronous motor.

Unit II: Basics of Microprocessor

Introduction to microprocessor, Advantages and disadvantages of microprocessor control, Structure of microprocessor, Generalized architecture of microprocessor, Functions of each block, Functional block diagram of 8085 microprocessors with pin diagram, logical block diagram of 8085 Microprocessor-Registers.

ALU, memory organization, decoder, serial control section, interrupt section, timing and control section, Assembly language Programming of 8085, Addressing Modes, Instruction classification, Instruction formats, Basic Assembly Language programming (only simple arithmetic operations-addition, subtraction).

Unit III: Basics of Microcontroller 8051

Micro controllers and microprocessors, Pin diagram of 8051 microcontrollers, Internal RAM, ROM and Special function registers in 8051chip, I/O ports.

Counters and Timers, interfacing with external memory I/O ports, Counters and Timers, Interfacing with external memory.

Unit IV: Microprocessor and Microcontroller Applications

Different types of memories: ROM, RAM, PROM, EPROM, EEPROM, Schematic diagram of memory chips decoder, memory interfacing., Memory I/O data transfer scheme for 8255.

Interfacing of switches and LEDs, Simple application ns of microprocessor and Microcontroller for temperature control of furnace, Traffic light control and SCR firing angle control using microprocessor, Data acquisition system.

Unit V: Programmable Logic Controller and SCADA

PLC: CPU, I/O modules, bus system, power supplies and remote I/Os, counter, timer, Different PLC's available in market, Selection of a PLC, SCADA- Concept and Application.

TEXT BOOKS:

1. Control Systems Engineering, Nagarath I. J., Gopal M., New Age Publishers, New Delhi.
2. Microprocessor Architecture, Programming and Applications with 8085, Gaonkar, Ramesh S., Penram International Publishing (India) Pvt. Ltd.
3. The 8051 Microcontroller Architecture, Programming and Applications, Ayala, Kenneth J., Penram International Publishing (I) Pvt. Ltd.
4. Programmable Logic Controllers And Applications, Webb, John W Ronald Reis. A., Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Fundamentals of Microprocessors and Microcontrollers, Ram, B., Dhanpat Rai Publications, New Delhi.
2. Microprocessors and Interfacing Programming and Hardware, Hall, Douglass V., TMH publication, New Delhi.
3. The 8051 Microcontroller and Embedded Systems using Assembly and C, Ali, Muhamad Mazidi, Janice Mazidi Gillispie, Roli, PHI Learning, New Delhi.

Course Outcomes: The Student will be able to

1. design the different types of control systems and to full fill the desired specifications.
2. analyze 8085 microprocessors architectures and its functionalities and real time applications using programming languages like Assembly Language and MASM.
3. explain the basics of 8051 microcontroller's architecture and its functionalities.
4. design microcontroller based projects for real time applications.
5. analyze PLC and SCADA and their functionalities.

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UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

FUNDAMENTALS OF HDL

(Open Elective-II)

Course Objectives: Students will

1. learn the fundamental of HDL language.
2. get the Knowledge about different levels of abstract.
3. construct Procedures, Tasks, and Functions using language.
4. write the programs in Mixed –Language Descriptions
5. define Synthesis and mapping of digital design

Unit I: Introduction: Why HDL?, A Brief History of HDL, Structure of HDL Module, Operators, Data types, Types of Descriptions, simulation and synthesis, Brief comparison of VHDL and Verilog.
Data –Flow Descriptions: Highlights of Data-Flow Descriptions, Structure of Data-Flow Description, Data Type – Vectors.

Unit II: Behavioral Descriptions
Behavioral Description highlights, structure of HDL behavioral Description, The VHDL variable –Assignment Statement, sequential statements.
Structural Descriptions: Highlights of structural Description, Organization of the structural Descriptions, Binding, state Machines, Generate, Generic, and Parameter statements.

Unit III: Procedures, Tasks, and Functions
Highlights of Procedures, tasks, and Functions, Procedures and tasks, Functions. Advanced HDL Descriptions: File Processing, Examples of File Processing.
Mixed –Type Descriptions: Why Mixed-Type Description? VHDL User-Defined Types, VHDL Packages, Mixed-Type Description examples.

Unit IV: Mixed –Language Descriptions
Highlights of Mixed-Language Description, How to invoke One language from the Other. Mixed-language Description Examples, Limitations of Mixed-Language Description.

Unit V: Synthesis Basics
Highlights of Synthesis, Synthesis information from Entity and Module.
Mapping Process and Always in the Hardware Domain.

TEXT BOOKS:
1. HDL Programming (VHDL and Verilog)- Nazeih M.Botros- John Weily India Pvt. Ltd. 2008.

REFERENCE BOOKS:
1. Fundamentals of HDL – Cyril P.R. Pearson/Sanguin 2010.
2. VHDL -Douglas perry-Tata McGraw-Hill.

3. A Verilog HDL Primer- J.Bhaskar – BS Publications.
4. Circuit Design with VHDL-Volnei A.Pedroni-PHI.

Course Outcomes: Students will be able to

1. understand the fundamental of HDL language.
2. analyze different levels of abstract.
3. create Procedures, Tasks, and Functions.
4. implement tasks in Mixed –Language Descriptions.
5. evaluate Synthesis and mapping of digital design.

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UGC AUTONOMOUS

B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

DATABASE MANAGEMENT SYSTEMS
(Open Elective-II)

Course Objectives:
The Student will:

1. Understanding of the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationshipand develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the consequences of concurrent data access.

UNIT - I:

Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor

ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model

UNIT - II:

Introduction to the Relational Model

-Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra

-Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT - III:

Form of Basic SQL Query

-Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity‟s – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Schema refinement

-Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT - IV:

Transaction Concept

-Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability– Implementation of Isolation – Testing for serializability- Lock – Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.

Recovery and Atomicity

-Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT - V:

Data on External Storage

-File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Advanced Database Management System

Introduction to Distributed Database-Reference Architecture, fragmentation, Allocation, Joins

Text Books:

1. **Data Base Management Systems**, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. **Data base System Concepts**, Silberschatz, Korth, McGraw hill, V edition.

Reference Books:

1. **Data base Systems design,** Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. **Fundamentals of Database Systems,** Elmasri Navrate Pearson Education
3. **Introduction to Database Systems,** C.J.Date Pearson Education

Course Outcomes:

The student will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language sql.
5. Analyze functional dependencies for designing a robust database

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B.Tech	**L**	**T-P-D**	**C**
III Year II Semester	**3**	**0-0-0**	**3**

CLOUD COMPUTING
(Open Elective-II)

Course Objectives:
Student will:

1. Learn about the cloud environment, services and hadoop
2. Classify cloud platforms and virtualization concepts
3. Identify cloud computing applications and enterprise cloud computing paradigms
4. Demonistrate cloud application development using python
5. Explain security concepts in the cloud

UNIT-I:

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

UNIT-II:

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization,

Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems

UNIT-III:

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT.

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV:

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python.

Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V:

Cloud management, Organizational Readiness and change management in the cloud age , Cloud Security, Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

TEXT BOOKS:

1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.

REFERENCE BOOKS:

1. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
2. Cloud computing: Dr Kumar Saurab Wiley India 2011.
3. Code in the Cloud: Mark C.Chu-Carroll 2011, SPD.(Second part of IV UNIT)

Course Outcomes:

Student will able to:

1. Understand about the cloud environment, services and hadoop
2. Differentiate cloud platforms and virtualization concepts
3. Describe cloud computing applications and enterprise cloud computing paradigms
4. Implement cloud application development using python
5. Apply security concepts in the cloud

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B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

E-WASTE MANAGEMENT

(OPEN ELECTIVE-II)

Course Objectives

At the end of the course , students will :

1. Know regarding E-Waste Management in India Global E-Waste Growth
2. Analyze the overview of WEEE.
3. Understanding scenarios for E-Waste management.
4. Visualize the basic concepts of E-Waste Regulation
5. Understand the basic concepts of Recycling technologies.

UNIT – I:

Introduction to e-Waste Management in India Global e-waste growth, Dark shadows of digitization on Indian horizon, e-waste generation, migration, Present practice and systems, disposal methods, Present processing practices, Initiatives to manage e-waste, Strengths and weaknesses of the current system.

UNIT – II:

WEEE (waste electrical and electronic equipment) - toxicity and healthHazardous substances in waste electrical and electronic equipment-toxicity and release, Occupational and environmental health perspectives of e-waste recycling.

UNIT – III:

Options and Scenarios for e-Waste Management Actions to be considered to achieve goals of e- waste management, Collection/ take back system, Closing the Plastic loop: Turning the supplychain into a supply cycle by mining plastics from end-of-life electronics and other durable
goods.

UNIT – IV:

E-waste regulation: E-waste legislation in the European Union and the Basel Convention. Regulating e-waste: a review of the international and national legal framework on e-waste Extended producer responsibility: a key tool for international rules and regulations on e-waste

UNIT – V:

Recycling technologies for e-waste Recycling of e-scrap in a global environment opportunities and challenges. Technologies for recovery of resources from e-waste. Reuse:A Bridge from Unsustainable e-waste to sustainable e-resources.

TEXT BOOKS:

1. Rakesh Johri, E-waste: Implications, regulations, and management inIndia and current global best practices.

2. Klaus Hieronymi, RamzyKahhat, Eric Williams, E-Waste Management: from Waste toResource

REFERENCE BOOKS:

1. Satish Sinha, PritiMahesh,Waste Electrical and Electronic Equipment The EUandIndia.
2. By Ronald E. Hester, Roy M. Harrison , Electronic WasteManagement.

Course Outcomes

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

1. Demonstrate knowledge of E-Waste management.
2. Implementing environmental health perspectives of E-Waste recycling.
3. Achieve goals of E-Waste management.
4. Develop the skills in E-Waste extended producer responsibility.
5. Describe the technologies for recovery of resources from E-Waste.

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO WEB DESIGN

(OPEN ELECTIVE-II**)**

Course Objectives

At the end of the course , students will :

1. Know regarding internet related technologies.
2. Understanding of the current industry support for web technologies.
3. Explain the basic concepts of CSS.
4. Visualize the basic concepts of PHP.
5. Understanding PHP functions and Methods

UNIT-I

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Web Design Principles: Basic principles involved in developing a web site, Planning process , Five Golden rules of web designing, Designing navigation bar ,Page design, Home Page Layout, Design Concept.

UNIT-II

Introduction to HTML : What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, HTML Tables, HTML Forms.

Elements of HTML: Introduction to elements of HTML, Working with Text Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT-III

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet and types of CSS, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties).

CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Colors, Creating page Layout and Site Designs.

UNIT-IV

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops.

Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

UNIT-V

Introduction to Web Publishing or Hosting : Creating the Web Site, Saving the site, Working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

TEXT BOOK:

1. Dietel and Dietel : —Internet and World Wide Web - How to Program‖, 5th Edition, PHI/Pearson Education,2011
2. Web Technologies: HTML,CSS, XML,Php BlackBook.

REFERENCE BOOKS:

1. Chris Bates, —Web Programming, building internet applications‖, 2ndEdition, WILEY, Dreamtech,2008.
2. HTML 5 in simple steps Kogent Learning Solutions Inc, DreamtechPress
3. Beginning CSS: Cascading Style Sheets for Web Design Ian Pouncey, ichard York Wiley India.

Course Outcomes:

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

1. Develop the application of the HTML for documentstructure.
2. Develop the skills in analyzing the usable of awebsite.
3. Create dynamic webpage, usingPHP.
4. Using PHP to manipulateFiles.
5. Develop the concept of webpublishing

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO EMBEDDED SYSTEMS

(OPEN ELECTIVE-II)

Course Objectives:

At the end of the course, students will learn:

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

UNIT–I:

Embedded Computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT–II:

The 8051 Architecture: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Basic Assembly Language Programming Concepts: The assembly language programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

UNIT–III:

Introduction to Real-Time Operating Systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Basic Design Using a Real-Time Operating System: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT–IV:

Embedded Software Development Tools: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

Debugging Techniques: Testing on host machine, using laboratory tools, an example system.

UNIT-V:

Introduction to advanced Architectures: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books:

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elseveir, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

References:

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

Course Outcomes:

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

1. Program an embedded system
2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.
3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.
4. Design embedded systems and real-time systems
5. Compare and contrast ARM, SHARC, internet enabled systems.

J. B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	L	T-P-D	C
III Year - II Semester	3	0-0-0	3

FUNDAMENTALS OF E-COMMERCE

(OPEN ELECTIVE-II)

Course Objectives:

At the end of the course, students will learn:

1. Identify the major categories and trends of e-commerce applications.
2. Identify the essential processes of an e-commerce system.
3. Identify several factors and web store requirements needed to succeed in e-commerce.
4. Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
5. Understand the main technologies behind e-commerce systems and how these technologies interact.

UNIT–I:

Introduction: Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT–II:

Consumer Oriented Applications: Mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT–III:

Electronic Data Interchange: EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT–IV:

Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books:

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce",Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course Outcomes:

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

1. Identify the business relationships between the organizations and their customers
2. Perform various transactions like payment, data transfer and etc.
3. Examine some typical distributed applications.
4. Detail some of the problems that are encountered when developing distributed applications.
5. Analyze the technologies that are used to support distributed applications.

Open Elective - III

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective-III)

Course Objectives: The Course objectives of this course are

1. To impart knowledge on Environmental management and environmental impact assessment.
2. To provide a basic understanding of the EIA process as it is used for research, planning, project or program evaluation, monitoring and regulatory enforcement.
3. To outline the impacts on soil, wetlands, flora, fauna, historical structures and the other socioeconomic environment.
4. To introduce students to the legal, economic, social, administrative and technical process preparing and evaluating environmental impact documents.
5. To assess the air and water quality parameters; predict the impacts and their mitigation measures.

UNIT - I:

Basics concepts of EIA: Initial environmental examination, elements of EIA, factors affecting EIA, impact evaluation and analysis, preparation of environmental base map, classification of environmental parameters.

EIA Methodologies: Introduction, Criteria for the selection of EIA methodology, EIA methods, Ad-hoc methods, matrix methods, network method, Environmental Media Quality Index Method (EMQI), Environmental media quality index method, overlay methods, cost/benefit analysis.

UNIT - II:

Impact of developmental activities and land use: Introduction and methodology for the assessment of soil and groundwater, delineation of study area, identification of of activities. Assessment of impact of developmental activities on vegetation and wildlife, environmental impact of deforestation- causes and effects of deforestation.

UNIT - III:

Procurement of relevant soil quality, impact prediction, assessment of impact significance, identification and incorporation of mitigation measures.

EIA of surface water, air and biological environment: Methodology for the assessment of impacts on surface water environment, air pollution sources, generalized approach for assessment of air pollution impact.

UNIT - IV:

Environmental audit and environmental legislation, objectives of environmental audit, types of environmental audit, audit protocel, stages of environmental audit onsite activities, evaluation of audit data and preparation of audit report, post audit activities.

UNIT - V:

Environmental protection Act, The water Act, The air Act (prevention and control of pollution Act), motor act, wild life act. Case studies of preparation of EIAs for various industries.

Text Books:

1. Environmental impact assessment methodologies, by Y.Anjaneyulu, B.S.Publication, Sultan bazaar Hyderabad.
2. Environmental impact assessment, by Alan Gilpin, Cambridge University Press

Reference Books:

1. Environmental pollution Control by Dr. H S Bhatia – Galgotia Publications Pvt Ltd, Delhi.
2. Environmental Impact Assessment and Management Publisher, Daya Author: B Hoisetti, A Kumar

Course Outcomes:

The Students will be able to

1. Explain different methodologies for environmental impact prediction and assessment.
2. Understand the elements of environmental impact assessments and processes by which they apply.
3. Carry out scoping and screening of developmental projects for environmental and social assessments.
4. Evaluate EIA reports.
5. Plan EIAs and environmental management plans

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

GREEN BUILDING TECHNOLOGY
(Open Elective-III)

COURSE OBJECTIVES: The objective of this course is to

1. Create awareness about the principles of green building technology and to have insight about the criteria for rating systems along with the established Indian codes and guidelines.
2. Establish a clear understanding of various renewable and non-renewable sources of energy along with their carbon foot prints and enumerates the process of performance testing including building modeling and energy analysis.
3. Discuss about the energy efficient green building materials and to have understanding on the cost-effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Give details on the principles of sustainable development in green building design.
5. Describe the best green building practices adopted along with cost/benefit and life-cycle analysis of green buildings.

UNIT-I

Concept of Green Buildings: Green building - Definition, Features, Necessity, Initiatives, Green buildings in India, Green building Assessment – Green Building Rating Systems (BREEAM, USGBC, LEED, IGBC, TERI-GRIHA, GREEN STAR), Criteria for rating, Energy efficient criteria, environmental benefits economic benefits, health and social benefits, Major energy efficiency areas for building, Contribution of buildings towards Global Warming. Life cycle cost of buildings, Codes and Certification Programs.

UNIT-II

Sources of Energy:

Renewable and Non-renewable sources of energy - Coal, Petroleum, Nuclear, Wind, Solar, Hydro, Geothermal sources, potential of these sources, hazards, pollution with reference to Global scenario, demand and supply in India, Global efforts to reduce carbon emissions, Performance testing. Building modeling- Energy analysis, Metering, Monitoring.

Carbon emission: Forecasting, Control of carbon emission, Air quality and its monitoring carbon foot print, Environmental issues, Minimizing carbon emission, Energy retrofits and Green Remodels.

UNIT-III

Green Building Materials: Sustainable Materials, Depletion of natural resources for preparation of building materials, renewable and recyclable resources, energy efficient materials, Embodied Energy of Materials. Green cement, Biodegradable materials, Smart materials, Manufactured Materials, Volatile Organic Compounds (Voc's), Natural Non-Petroleum Based Materials, Recycled materials, Renewable and Indigenous Building Materials, Engineering evaluation of these materials.

Green Building Planning and Specifications: Environment friendly and cost effective Building Technologies, Integrated Life cycle design of Materials and Structures, Green Strategies for Building Systems, Alternative Construction Methods, Energy Conservation Measures in Buildings, Waste and Water management and Recycling by Sustainable Facilities, Heating, Ventilation and Air Conditioning, Passive Solar and Daylight, Plumbing and its Effect on Energy Consumption

UNIT-IV

Design of Green Buildings; Sustainable sites, Impact of construction on environment, Life cycle assessment, Principles of sustainable development in Building Design, Design on Bioclimatic and solar passive architecture, Considerations of energy consumption, water use, and system reliability, indoor air quality, noise level, comfort, cost efficiency in building design, Advanced Green building technologies and innovations.

UNIT-V

Construction of Green Buildings: Energy efficient construction, Practices for thermal efficiency and natural lighting. Ecofriendly water proofing; Energy conservation building codes building rating, Maintenance of green buildings, Cost and Performance Comparisons and Benchmarking, Green Project Management Methods and Best Practices, Cost/benefit analysis of green buildings, Life-cycle analysis of green buildings, Case studies of rated buildings (new and existing)

TEXT BOOKS:

1. Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkata Rama Reddy & K S Nanjunda Rao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – By AskoSarja – SPONPress
3. Non-conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Green Buildings (McGraw hill publication): by Gevorkian

REFERENCE BOOKS:

1. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design
2. Understanding Green Building Guidelines: For Students and Young Professionals, Traci Rose Rider, W. W. Norton & Company Publisher.
3. Understanding Green Building Materials, Traci Rose Rider, W. W. Norton & Company Publisher.

List of free reference guides/resources available on the net:

1. IGBC reference guide
2. Free abridged versions of LEED reference guides
3. ECBC latest version
4. US GBC's Reference Material

COURSE OUTCOMES:

After completion of the course the student will be able to

1. Know the underlying principles, history, environmental and economic impacts of green building technology and to identify the criteria for rating systems along with the established Indian codes and guidelines.
2. Identify various Renewable and Non-renewable sources of energy along with their carbon foot prints and comprehend the techniques and benefits of building performance testing such as building modeling and energy analysis, monitoring and metering.
3. Recognize the energy efficient green building materials and explain the cost effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.
4. Identify and compare cost and performance of building materials with recycled components, non-petroleum-based materials, materials with low volatile organic compounds, materials with low embodied energy and salvaged materials and incorporate them into design.
5. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

Materials in Electrical Systems

(Open Elective - III)

UNIT - I:

Materials- Conductors-free electron theory and electron scattering Di electrics Polarization, solid, liquid and gas dielectrics Insulators-Classification, Application in electric devices.

UNIT - II:

Magnetic materials-classification based on orientation of magnetic dipoles, Optoelectronic materials, Semiconductors-simple and compound, Refractory Materials. Solders and contacts, Super conductivity and super conducting materials.

UNIT - III:

Components- Resistors and Capacitors. Display units:-LED, LCD and Monitors. Effect of environment on components.

UNIT - IV:

Processes- Basic processes used in the manufacture of integrated circuits such as Epitaxy, masking, photolithography, diffusion, oxidation, Etching, metallization, Scribing, wire bonding and Encapsulation. Induction and Dielectric heating. Electron beam welding and cutting.

UNIT - V:

Cables- Calculations of capacity of cables, charging current, stress, grading, heating of cables, Construction and characteristics of HV & EHV cable

Text Books:

1. S.O. Kasap, Principles of Electrical Engineering Materials," MGH.
2. Mahajan, Principles of growth and processing of semiconductors," MGH.

References Books:

1. Dhir, Electronic components and Materials Principles manufacturing and Maintenance," TMH.
2. Allison, „Electronic Engineering Materials and Devices," TMH.
3. Ruska N Scot, Microelectronic processing – an introduction to the manufacture of integrated circuits," MGH.
4. Decker, Electrical Engineering Materials," PHI.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

Field Theory and Circuits
(Open Elective - III)

UNIT - I: Field Theory:
Review of Vector Analysis- Coordinate Systems, Vectors, gradient, divergence, curl, Laplacian, divergence theorem, Stoke‟s theorem.

UNIT - II:
Electric and Magnetic fields- Electric fields due to distributed charges configurations line(s) of charges, uniform plane surface and spherical volume charge distributions; behavior of conductors and dielectrics in electrostatic fields, boundary conditions, applications of ampere‟s law and Biot- Savart‟s law; capacitance and inductance calculations for simple configurations; time varying fields – displacement current, Maxwell‟s equations; Laplace‟s and Poisson‟s equations.

UNIT - III: Circuit Theory:
Classification of circuits, sources and signals, standard signals, source transformations. Network topology, graph matrices, formulation and solution of circuit equations based on graph theory using different analysis techniques- circuit, cut set and mixed. Concept of duality.

UNIT - IV:
Network theorems and their applications-Superposition, reciprocity, Thevenin, Norton, Maximum power transfer, Millman, Substitution, Compensation and Tellegan‟s theorem. Analysis of circuits subject to periodic and non-periodic excitations using Fourier series and Laplace transforms.

UNIT - V:
Concept of free and forced response of circuits. Time constants and Transient response under d.c. and a. c. excitation. Analysis of magnetically coupled circuits. Analysis of circuits with dependent sources.

Text Books:

1. N.N. Rao, „Basic Electromagnetic with applications‟, PHI
2. Desoer & Kuh, — Basic Circuit theory‖, McGraw Hill.

References Books:

1. E.C. Jordan and K.G. Balmain, „Electromagnetic waves and radiating systems‟, PHI
2. D.J. Griffith, „Introduction to Electrodynamics‟, PHI .
3. Guru & Hiziroglu, „ Electromagnetic field theory fundamentals‟, Vikas Publishing House
4. Van Valkenberg , —Network Analysis‖, PHI.
5. Valkenberg & Kinariwala , —Linear Circuits‖, PHI.
6. Trick , —Introduction to circuit Analysis‖, Wiley.
7. Roy Choudhary , —Networks & systems‖, Wiley.

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year -II Semester	**3**	**0-0-0**	**3**

RELIABILITY ENGINEERING

(OPEN ELECTIVE-III)

Course Objectives:

The student will

1 Know the micro systems and its manufacturing techniques.

2 Understand the working of micro sensors and actuators.

3 Design Microsystems

Course Outcomes:

The student will be able to

1 Overview of micro systems and explain the micro manufacturing techniques.

2 Discuss the principles and types of micro sensors and actuators.

3 Understand the fundamentals of micro fluidics and design Microsystems.

UNIT - I

Basics concepts of reliability: Introduction, Reliability and quality, Failures and failure modes, Causes of failures and reliability, Maintainability and availability, History of reliability, reliability literature.

Reliability mathematics: Introduction, Random experiment , Probability , Random variables, Distribution functions, Discrete distribution ,Continuous distribution, Numerical characteristics of random variables , Laplace transform.

UNIT- II

Component reliability and hazard models: Introduction, Component reliability from test data, Mean time to failure, Time – dependent hazard models, Stress- Dependent hazard models, Derivation of reliability function using Markov, Treatment of field data.

System reliability models: Introduction - Systems with component within series - Systems with parallel components - k-out – of- m systems - Non series parallel systems - Systems with - mixed – mode failures - Fault- tree technique

UNIT- III

Maintainability and availability concepts: Introduction - Maintainability function - Availability function - Frequency of failures - Two-unit parallel systems with repair - k-out- of-m systems - Preventive maintenance.

Reliability improvement: Introduction - Improvement components - Redundancy - Element redundancy - Unit redundancy - Stand by redundancy - Optimization - Reliability – cost trade – off.

UNIT- IV

Economics of reliability engineering: Economic issues - Manufacture's cost - Customer's cost - Reliability achievement cost - models - Reliability utility cost models - Depreciation cost models - Availability – cost – model of parallel systems

UNIT- V

Reliability management: Reliability programming - Management policies and decision - Reliability management by objectives - Reliability group - Reliability data: Acquisition and analysis - Managing people for reliability.

TEXT BOOKS;

1. Reliability Engineering: Balaguruswamy, Tata McGrawHill
2. Reliability Engineering: L.B.Srinath, East West Publications.

REFERENCE BOOKS:

1. Reliability Engineering: Patrick DTO, Wiley Conor-India
2. Reliability Engineering and life testing, Naikan-PHI Publications.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B. Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

SPECIAL MANUFACTURING PROCESS
(OPEN ELECTIVE-III)

Course Objectives:
The Student will :

1. To expose the students to a variety of manufacturing processes including their typical use and capabilities.
2. To teach the important effects that manufacturing processes may have on the material properties of the processed part with a focus on the most common processes.
3. To teach the thermal and mechanical aspects, such as force, stress, strain, and temperature, of the most common processes.
4. To provide a technical understanding of common processes to aid in appropriate process selection for the material and required tolerances
5. To provide a technical understanding of common processes to aid in appropriate material selection for a predetermined process

UNIT I: Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns – Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands. Methods of Melting – Crucible melting and cupola operation – Defects in castings; Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design. Solidification of casting – Solidification of pure metal – Nucleation and grain growth, casting design considerations.

UNIT II: Welding: Classification – Types of welds and welded joints; Gas welding – Types, oxy-fuel gas cutting – standard time and cost calculations. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.

UNIT III: Inert Gas Welding _ TIG Welding, MIG welding, Friction welding, induction welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT IV: Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth. Rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements Stamping, forming and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT V: Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion – Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects – cold forging, swaging, Forces in forging operations.

TEXT BOOKS :

1. Manufacturing Technology / P.N. Rao Vol.1 & 2 / Mc Graw Hill
2. Manufacturing Engineering & Technology / Serope Kalpakjian / Steven R. Schmid /Pearson

REFERENCES:

1. Metal Casting / T.V Ramana Rao / New Age
2. Production Technology / G. Thirupathi Reddy / Scitech

Course outcomes:

The student will be able to:

1. Understand the idea for selecting materials for patterns. Types and allowances of patterns used in casting and analyze the components of moulds.
2. Design core, core print and gating system in metal casting processes
3. Understand arc, gas, solid state and resistance welding processes.
4. Develop process-maps for metal forming processes using plasticity principles.
5. Identify the effect of process variables to manufacture defect free products

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

PRINCIPLES OF COMPUTER COMMUNICATION AND NETWORKS

(Open Elective-III)

Course Objectives:

1. To understand the Analog and Digital Communication concepts.
2. To understand the concept of computer communication.
3. To learn about the networking concept, layered protocols.
4. To understand various communications concepts.
5. To get the knowledge of various networking equipments.

UNIT-I

Analog and Digital Communication Concepts: Representing data as analog signals, representing data as digital signals, data rate and bandwidth reduction, Digital Carrier Systems.

UNIT II

Overview of Computer Communications and Networking: Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security, Network Standards, The Telephone System and Data Communications.

UNIT III

Essential Terms and Concepts: Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications, Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

UNIT IV

Physical and data link layer Concepts: The Physical and Electrical Characteristics of wire, Copper media, fiber optic media, wireless Communications. Introduction to data link Layer, the logical link control and medium access control sub-layers.

UNIT V

Network Hardware Components: Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, switches Vs Routers.

TEXT BOOKS:

1. Computer Communications and Networking Technologies, Michel A. Gallo and William H. Hancock, Thomson Brooks / Cole.
2. Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition MC GRAW HILL EDUCATION, 2006.

REFERENCE BOOKS:

1. Principles of Computer Networks and Communications, M. Barry Dumas, Morris Schwartz, Pearson.
2. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

Course Outcomes: The student will be able to

1. explain the networking of computers and data transmission between computers.
2. exposure about the various communication concepts.
3. get awareness about the structure and equipment of computer network structures.
4. illustrate the Physical and data link layer concepts.
5. get knowledge about network hardware components.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

SPEECH PROCESSING
(Open Elective-III)

Course Objectives:

1. To introduce speech production and related parameters of speech.
2. To show the computation and use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.
3. To understand different speech modeling procedures such as Markov and their implementation issues.
4. To understand the basic concepts of speech recognition.
5. To gain knowledge on speech synthesis.

UNIT- I :BASIC CONCEPTS:
Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.

UNIT- II: SPEECH ANALYSIS:
Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.

UNIT- III: SPEECH MODELING:
Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, and Implementation issues. Speech Recognition: Large Vocabulary Continuous.

UNIT- IV: SPEECH RECOGNITION:
Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – ngrams, context dependent sub-word units; Applications and present status.

UNIT –V: SPEECH SYNTHESIS:
Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.

Text Books:

1. Lawrence Rabiner and Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson education, 2003.
2. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.

References:

1. Steven W. Smith, “The Scientist and Engineer‟s Guide to Digital Signal Processing”, California Technical Publishing, 1997.
2. Thomas F Quatieri, “Discrete-Time Speech Signal Processing – Principles and Practice”, Pearson Education, 2004.

Course Outcomes:

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

1. model speech production system and describe the fundamentals of speech.
2. extract and compare different speech parameters.
3. choose an appropriate statistical speech model for a given application.
4. design a speech recognition system.
5. use different speech synthesis techniques.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year – II Semester	**3**	**0-0-0**	**3**

SOFT COMPUTING
(Open Elective-III)

Course Objectives:

Student will:

1. Classify the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications
2. Develop the understanding concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
3. To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering.
4. Decribe fuzzy systems with membership functions
5. Determine the genetic algorithms, its applications and advances.

UNIT-I:

Introduction: Neural Networks, Fuzzy Logic, Genetic Algorithms, Hybrid Systems, Soft Computing, Soft Computing Constituents, Soft Computing Characteristics. Artificial Neural Networks: Introduction, Fundamental Concept, Evolution of Neural Networks, Basic models of ANN, Important Terminologies.

UNIT-II:

Supervised Learning Networks : Introduction, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks : Introduction, Training Algorithms for pattern association and Hopfield Networks.

UNIT-III:

Unsupervised Learning Network : Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Counter Propagation Networks.
Fuzzy Sets : Introduction, Classical Sets, Fuzzy Sets, Classical Relations, Fuzzy Relations

UNIT-IV:

Membership functions- Features, Fuzzification, Membership value assignments, Defuzzification Methods, Fuzzy Arithmetic, Fuzzy Measures, Fuzzy Inference Systems, Fuzzy Logic Control Systems

UNIT-V:

Genetic Algorithms- Introduction, Basic operators and terminology, Traditional Algorithm vs Genetic Algorithm, Simple GA, General GA, Classification of GA, Genetic Programming, Applications of GA.
Applications of Soft Computing : Internet Search Technique, Hybrid Fuzzy Controllers.

TEXT BOOKS:

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007
2. Neuro-Fuzzy and Soft Computing A Computational Approach to Learning and Machine Intelligence – J.S.R.Jang, C.T.Sun, E.Mizutani, PHI 177

REFERENCE BOOKS:

1. Artificial Intelligence and Soft Computing- Behavioral and Cognitive Modeling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva,. Pearson Edition, 2004.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.

Course Outcomes:

Student will able to:

1. Learn about soft computing techniques and their applications
2. Analyze various neural network architectures
3. Apply perceptrons and counter propagation networks.
4. Define the fuzzy systems
5. Analyze the genetic algorithms and their applications

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year – II Semester	**3**	**0-0-0**	**3**

E-COMMERCE
(Open Elective-III)

Course objectives:

1. Gain knowledge about the main objective and at the same time need is transaction on your web store. Of, course if you are selling products online what you require are customers. If you are getting good reach ability then your business will definitely grow. Therefore one of the objectives is high reachability.
2. Solve conversions i.e., if people are coming on your web store and purchasing something then it will calculate as conversions and from the number of people who are buying stuff from your web store we can calculate the conversion rate.
3. Provide customer satisfaction i.e., customer is the main part of any e-commerce business so it's very important to make your customer happy and satisfied by providing quality and desirable products, on time delivery, 24*7 customer support, and timely sale & best deal offers you can make your customer happy. It is one of the main objectives of e-commerce.
4. Receive social popularity i.e., unless and until you are not famous and popular among people you cannot establish your brand. Social presence with omni channel and digital marketing is essential for any e-commerce business.
5. Know about Consumer Search and Resource Discovery.

UNIT-I:
Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT-II:
Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.
Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

UNIT-III:
Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.
Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

UNIT-IV:
Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

UNIT-V:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education

Course outcomes:

1. Demonstrate an understanding of the foundations and importance of e-commerce.
2. Demonstrate an understanding of retailing in e-commerce by:
    a. Analyzing branding and pricing strategies,
    b. Using and determining the effectiveness of market research.
    c. Assessing the effects of disintermediation.
3. Analyze the impact of e-commerce on business models and strategy.
4. Describe internet trading relationships including business-to-business, intraorganizational.
5. Describe the infrastructure for E-Commerce.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year – II Semester	**3**	**0-0-0**	**3**

INTERNET OF THINGS
(Open Elective-III)

Course Objectives

1. Understand the current vision of the Internet of Things and its impact on theworld
2. Classify basic concepts of IoT and M2M &IoT system management
3. Describe concepts of python language and different python packages.
4. Explain how to design IoT Physical devices with built-ins of python Programs
5. Identify the advanced concepts of IoT physical servers, cloud offerings.

UNIT-I:

Introduction to Internet of Things –Introduction, Definition and Characteristics of IoT,
Physical Design of IoT – Things inIoT, IoT Protocols, Logical Design of IOT- IoT Functional Blocks,IoTCommunication Models, IoT Communication APIs
IoT Enabling Technologies – Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems
Domain Specific IoTs – Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

UNIT-II:

IoT and M2M – Introduction,M2M,Difference between IOT and M2M,**SDN and NFV for IoT**-Software Defined Networking, Network Function Virtualization,
IoT System Management with NETCONF-YANG- Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements,NETCONF, YANG, NETOPEER.

UNIT-III:

IoT Systems-Logical Design Using Python-Introduction, Installing Python, Data types and Data Structures, Control Flow, Functions, Modules, Packages, File handling, Date/Time Operations, Classes.
Python Packages of Interest for IoT- JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT-IV:

IoT Physical Devices and Endpoints – What is an IoTDevice,Exemplary Device: Raspberry Pi,About the Board,Linux on Raspberry Pi, Raspberry PI-Interfaces (Serial, SPI, I2C),Programming
Raspberry Pi with Python-Controlling LED, interfacing an LED and Switch and interfacing a light sensor with Raspberry Pi,

UNIT-V:

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage Models and communication APIs.
WAMP-AutoBahn for IoT,Xively Cloud for IoT, Python web application framework
Designing a RESTful web API,

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Course Outcomes

1. Analyze current vision of the Internet of Things and its impact on the world.
2. Demonstrate basic concepts of IoT and M2M &IoT system management
3. Practice the concepts of python language using different python packages
4. Design IoT Physical devices using python Programming.
5. Categorize advanced concepts of IoT physical servers, cloud offerings.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year II- Semester	**3**	**0-0-0**	**3**

SEMANTIC WEB AND SOCIAL NETWORKS

(Open Elective-III)

Course Objectives

1. Explain the fundamentals of Semantic Web technologies.
2. Explain the Implementation of semantic web applications and the architectures of social networking
3. Discuss which brings together forward looking research and technology that will shape our world more intimately than ever before as computing becomes an extension of human experience;
4. Discuss that covers all aspects of computing that is very closely tied to human perception, understanding and experience;
5. Discuss which brings together computing that deal with semantics, perception and experience and serves as the Plat form for exchange of both practical technologies and far reaching research.

UNIT I

Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web

Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee, www, Semantic Web Road Map, Logic on the semantic Web.

UNIT II

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web - Resource Description Framework (RDF) / RDF Schema. Ontology Web Language (OWL), UML, XML and XML Schema.

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping,

UNIT III

Logic, Rule and Inference Engines. Semantic Web applications and services. Semantic Search,e-learning, Semantic Bioinformatics, Knowledge Base

UNIT IV

XML Based Web Services, Creating an OWL-S Ontology for Web Services. Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT V

What is social Networks analysis, development of the social networks analysis.Electronic Sources for Network Analysis - Electronic Discussion networks.

Blogs and Online Communities. Web Based Networks. Building Semantic Web Applications with social network features.

TEXTBOOKS:

1. Thinking on the Web - Berners Lee.Godel and Turing,Wiley interscience,20()8.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCE BOOKS:

1. Semantic Web Technologies,Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer. Paul \Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang LuChapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

Course Outcomes

1. Demonstrate knowledge and be able to explain the three different "named" generations of the web
2. Demonstrate the ability to participate materially in projects that develop Programmes relating to **Web** applications and the analysis of Web data.
3. Analyze key Web applications including search engines and social networking sites.
4. Illustrate the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
5. Analyze and explain how technical changes affect the social aspects of Web-based computing.

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

FUNDAMENTALS OF INTELLIGENCE SYSTEMS

(OPENELECTIVE-III)

Course Objectives:

1. Understand In-depth of specialist bodies of knowledge within the engineering discipline.
2. Establish engineering methods to complex engineering problem solving.
3. Be Fluent application of engineering techniques, tools and resources .
4. Learn the difference between optimal reasoning vs human like reasoning.
5. Understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities

UNIT–I:

Introduction to Artificial Intelligence: Introduction to AI-Problem formulation, Problem Definition -Production systems

Control strategies, Search strategies. Problem, characteristics, Production system characteristics -Specialized production system

UNIT–II:

Representation of Knowledge: Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution

Use of predicate calculus, Knowledge representation using other logic Structured representation of knowledge.

UNIT–III:

Knowledge Inference: Knowledge representation Production based system, Frame based system

UNIT–IV:

Inference - Backward chaining, forward chaining, Rule value approach Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT-V:

Expert Systems: Expert systems - Architecture of expert systems

Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics.

Text Books:

1. Kevin Night, Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Tata McGraw-Hill Education Private Limited, 3rd edition, 2009, ISBN: 978-0070678163.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2nd edition, 2007.ISBN, 0132097680.

Course Outcomes:

1. Gain basic understanding of the underlying principles and philosophy of computational intelligence systems Technologies.
2. Be capable of constructing intelligent systems (in software) that perform useful engineering tasks.
3. Possess the ability to formulate an efficient problem space for a problem expressed in English.
4. Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
5. Possess the skill for representing knowledge using the appropriate technique.

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UGC AUTONOMOUS

B.Tech.	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

INTRODUCTION TO NEURAL NETWORKS

(OPEN ELECTIVE-III)

Course Objectives:

1. Understand the differences and similarities neural network, human brain and feedback systems
2. Learn the different learning techniques
3. Familiar with the concept of single layer perceptron and its algorithms.
4. Familiar with the concept of multilayer perceptron and its algorithms
5. Know the self-organisation mapping techniques.

UNIT–I:

Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs

Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

UNIT–II:

Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning

Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

UNIT–III:

Single layer perceptrons: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves

Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier foe a Gaussian Environment.

UNIT–IV:

Multilayer Perceptrons: Back propagation algorithm XOR problem

Heuristics, Output representation and decision rule, computer experiment, feature detection.

UNIT-V:

Self –Organization Maps: Two basic feature mapping models, Self-Organization maps, SOM algorithm.

Hopfield models: Hopfield models, computer experiment.

Text Books:

1. Neural networks A comprehensive foundation, Simon Haykin, PHIedition.
2. Artificial neural networks- B. Vegnanarayana Prentice Halll of India P Ltd 2005.

Reference Books:

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapura. Pearson education 2004.

Course Outcomes:

1. Know differences and similarities between neural network, human brain and feedback systems
2. Get the knowledge of different learning techniques
3. Describe the concept of single layer perceptron and its algorithms.
4. Describe the concept of multilayer perceptron and its algorithms.
5. Analyse the self-organisation mapping techniques.