JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU
B.Tech. (ECE) 2017-18
COURSE STRUCTURE

I YEAR I SEMESTER

Code	Subject	L	T	P	C
17A15501	English	3	-	-	3
17A15101	Mathematics -I	2	2	-	3
17A15201	Applied Physics	3	-	-	3
15A10101	Environmental Studies	3	-	-	3
17A10301	Engineering Drawing	1	1	3	3
17A10501	Problem Solving & Computer Programming	3	-	-	3
17A15202	Applied Physics Lab	-	1	3	2
17A10502	Computer Programming Lab	-	1	3	2
17A15502	English Language Communication Skills Lab	-	1	3	2
17A12451	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**06**	**12**	**25**

I YEAR II SEMESTER

Code	Subject	L	T	P	C
17A25501	Technical Communication and Presentation Skills	3	-	-	3
17A25101	Mathematics -II	2	2	-	3
17A25301	Applied Chemistry	3	-	-	3
17A25102	Mathematical Methods	2	2	-	3
17A20401	Network Analysis	2	2	-	3
17A20402	Electronic Devices	3	-	-	3
17A25302	Applied Chemistry Lab	-	1	3	2
17A23501	Engineering & IT Workshop	-	1	3	2
17A20403	Electronic Devices Lab	-	1	3	2
17A29901	Community Service (Audit)	-	-	2	-
17A20406	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**09**	**11**	**25**

II YEAR I SEMESTER

Code	Subject	L	T	P	C
17A35103	Complex Variables and Special Functions	3	-	-	3
17A30401	Probability Theory and Stochastic Processes	3	-	-	3
17A30402	Electronic Circuits - I	3	-	-	3
17A30403	Signals and Systems	3	-	-	3
17A30205	Electrical Technology	2	2	-	3
17A30404	Electronic Circuits – I Lab	-	1	3	2
17A30405	Basic Simulation Lab	-	1	3	2
17A30206	Electrical Technology Lab	-	1	3	2
17A45101	Human Values & Professional Ethics(Audit)	2	-	-	-
17A30406	Comprehensive Objective type Examination	-	-	-	1
	Total	**16**	**05**	**09**	**22**

II YEAR II SEMESTER

Code	Subject	L	T	P	C
17A40401	Electromagnetic Field Theory	3	-	-	3
17A40402	Switching Theory and Logic Design	2	2	-	3
17A40403	Electronic Circuits - II	3	-	-	3
17A40404	Networks and Transmission Lines	2	2	-	3
17A40207	Control Systems Engineering	2	2	-	3
17A40405	Data Structures & Object Oriented Programming	2	2	-	3
17A40406	Electronic Circuits – II Lab	-	1	3	2
17A40407	Data Structures Lab	-	1	3	2
17A40408	Comprehensive Objective type Examination	-	-	-	1
	Total	**14**	**10**	**06**	**23**

III YEAR I SEMESTER

Code	Subject	L	T	P	C
17A35401	Managerial Economics and Financial Analysis	3	-	-	3
17A50401	Linear IC Applications	3	-	-	3
17A50402	Analog Communication Systems	3	-	-	3
17A50403	Digital Design using VHDL	3	-	-	3
17A50404	Antennas and Wave propagation	3	-	-	3
17A50405	Linear IC Applications Lab	-	1	3	2
17A50406	Analog Communication Systems Lab	-	1	3	2
17A50407	VHDL Programming Lab	-	1	3	2
17A50408	Object Oriented Programming Lab	-	-	2	1
17A50409	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**03**	**11**	**23**

III YEAR II SEMESTER

Code	Subject	L	T	P	C
17A60401	Microprocessors & Microcontrollers	3	-	-	3
17A60402	VLSI Design	2	2	-	3
17A60403	Digital Communication Systems	3	-	-	3
17A60404	Digital Signal Processing	2	2	-	3
17A60405 17A60406 17A60407	**Open Elective - I** Principles of Electronic Communication Systems Digital Electronics Principles of Digital Signal Processing	3	-	-	3
17A60408	Microprocessors & Microcontrollers Lab	-	1	3	2
17A60409	Digital Communication Systems Lab	-	1	3	2
17A65501	Advanced Communication Skills Lab	-	1	3	2
17A69901	Foreign Language (Audit)	2	-	-	-
17A60410	Comprehensive Objective type Examination	-	-	-	1
	Total	**15**	**07**	**09**	**22**

IV YEAR I SEMESTER

Code	Subject	L	T	P	C
17A75401	Management Science	3	-	-	3
17A70401	Electronic Measurements & Instrumentation	3	-	-	3
17A70402	Optical Communications	3	-	-	3
17A70403	Microwave Engineering	3	-	-	3
17A70404 17A70405 17A70406	**Elective – I** a. Data Communications & Networking b. Television Engineering c. Radar Engineering	3	-	-	3
17A70407 17A70408 17A70409	**Open Elective – II** Electronic Measuring Instruments Fuzzy Logic & Neural networks Microcontrollers and Applications	3	-	-	3
17A70410	Digital Signal Processing Lab	-	1	3	2
17A70411	Microwave & Optical Communications Lab	-	1	3	2
17A70412	Comprehensive Objective type Examination	-	-	-	1
17A70413	MOOC-I (Audit)	-	-	-	-
	Total	**18**	**02**	**06**	**23**

IV YEAR II SEMESTER

Code	Subject	L	T	P	C
17A80401 17A80402 17A80403	**Elective – II** a. Embedded Systems b. Coding Theory and Techniques c. Satellite Communications	3	-	-	3
17A80404 17A80405 17A80406	**Elective – III** a. Digital Image Processing b. Scripting Languages c. RF Circuit Design	3	-	-	3
17A80407 17A80408 17A80409	**Elective – IV** a. Artificial Intelligence b. Data Compression and Encryption c. Cellular & Mobile Communications	3	-	-	3
17A80410	Seminar	-	-	4	2
17A80411	Project Work	-	-	20	10
17A80412	Comprehensive Objective type Examination	-	-	-	1
17A80413	MOOC-II(Audit)	-	-	-	-
	Total	**09**	**00**	**24**	**22**

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

L – Theory T- Tutorial P – Practical/Drawing C – Credits

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I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A15501	**English**	3	-	-	3

COURSE OBJECTIVES	
1	To enable the students to communicate in English for academic and social purpose
2	To enable the students to acquire structures and written expressions required for their profession.
3	To develop and practice critical and evaluative reading
4	To encourage investigating questions of the humanities through rhetorical study
5	To enhance the study skills of the students with emphasis on LSRW skills

COURSE OUTCOMES	
CO1	Develop facility in responding to a variety of situations and contexts calling for purposeful shifts in voice, tone, level of formality, design, medium, and/or structure
CO2	Become effective in the use of different modes of written communication in a professional environment
CO3	Develop capacity to apply different reading methods to evaluate a mass of data on the net and to glean the necessary information
CO4	Learn and use key rhetorical concepts through analyzing and composing a variety of texts
CO5	Well trained in LSRW skills and develop communicative competence

UNIT –I

Chapter entitled *Humour* from "Using English"
Chapter entitled "Jagadish Chandra Bose" from New Horizons
L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II

Chapter entitled *Inspiration* from "Using English"
Chapter entitled "Dhyan Chand" from New Horizons
L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

Chapter entitled *Sustainable Development* from "Using English"
Chapter entitled "After Twenty Years" from New Horizons
L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter

G- Tenses – Present tense, Past tense and Future tense
V-Word formation and One-Word Substitutes

UNIT –IV

Chapter entitled *Relationships* from "Using English"
Chapter entitled "The Tiger in the Tunnel" from New Horizons
L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information
W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

UNIT –V

Chapter entitled Science and Humanism from "Using English"
Chapter entitled a. "Daffodils" b. "Where the mind is Without Fear" from New Horizons
L- Listening to speeches
S- Making Presentations and Group Discussions
R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately

Text Books:

1. **Using English (for detailed study)** published by Orient Black Swan, 2013
2. **New Horizons (for non detailes study) published by Pearson, 2013**

References:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **Every Day Dialogues in English- Robert J.Dixson, Prentice Hall of India**
3. **Communication Skills, Sanjay Kumar &Pushpalatha** Oxford University Press, 2012.
4. **A Course in Communication Skills**- KiranmaiDutt& co. Foundation Books, 2012.
5. **Current English grammar and usage-**S M Guptha, PHI, 2013.
6. **A Course in Listening and Speaking-SasiKumar.U, U.K.Cambridge**
7. **Powerful Vocabulary Builder**- AnjanaAgarwal New Age International Publishers, 2011.
8. **Writing with a Purpose, Tickoo and Sasi Kumar, OUP, 2011**
9. **Oxford Advanced Learners Dictionary, 9th edition, Oxford, 2016**

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I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A15101	**Mathematics – I**	**2**	**2**	**-**	**3**

COURSE DESCRIPTION: First order differential equation, higher order linear differential equations; functions of several variables; applications of integration; multiple integrals, vector calculus.

COURSE OBJECTIVES	
1	To impart knowledge on the advanced concepts of linear differential equations, functions of several variables, applications of derivatives, multiple integrals and vectors calculus.
2	To develop skills in analyzing the problems, designing mathematical models, skills in differentiation, integration, and vectors calculus for the problems in engineering.

COURSE OUTCOMES	
After completion of the course a successful student is able to	
CO1	Acquire knowledge in (a) Higher order Differential equations (b) Maximum and minimum values for the functions of several variables (c) Double and triple integrals (d) Differentiation and integration of vector functions. (e) Line and surface volume (f) Transforming integrals from three dimensional surfaces and volumes on to plane surfaces
CO2	Develop skills in analyzing the (a) methods for differential equation for obtaining appropriate solutions, (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems (c) The variations in the properties of functions near their stationary values (d) Flow patterns of fluids, electrical and magnetic flux and related aspects
CO3	Develop skills in designing mathematical models for (a) R-C and L-R-C oscillatory electrical circuits (b) Mechanical oscillations. (c) Deflection of Beams. (d) Heat transfer and Newton's laws of cooling (e) Engineering concepts involving lengths of curves and areas of planes Flux across surfaces
CO4	Develop analytical skills in solving the problems involving (a) Newton's laws of cooling (b) non homogeneous linear differential equations (c) maximum and minimum values for the functions (d) lengths of curves, areas of surfaces and volumes of solids in engineering (e) transformations of integrals from three dimensional surfaces and volumes on to plane surfaces
CO5	Use relevant mathematical techniques for evaluating (a) various types of particular integrals in differential equations (b) stationary values for multi variable functions (c) multiple integrals in change of variables (d) Integrations of vector functions.

UNIT I

FIRST ORDER DIFFERENTIAL EQUATIONS(6 periods)

Linear and Bernoulli type, exact equations and reducible to exact.Orthogonal trajectories (Both Cartesian and polar forms).Newton's law of cooling.

UNIT II

HIGHER ORDER LINEAR DIFFERENTIALEQUATIONS(12 periods)

Method for solution of linear equations- Differential operator *D*, Solution of second order linear homogeneous equations with constant coefficients, Solution of Higher order homogeneous linear equations with constant coefficients, Solution of Non homogeneous linear equations-Operator methods for finding particular integrals- for cases – e^{ax}, sinax, cos ax, x^n, $e^{ax}V(x)$, $xV(x)$. Method of Variation of parameters. Applications of linear differential equations-Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT III

Power Series Expansions &Multi-variable Calculus (8 Lectures)

Taylor series, Maclaurin series. Functions of several variables, Continuity, Partial derivatives, Total derivative, Increment theorem, Chain rule, Tangent plane and Normal line, Mixed derivative theorem, Necessary and sufficient conditions for Maxima, Minima and Saddle point, The method of Lagrange multipliers.

UNIT IV

Multiple Integrals (6 Lectures)

Double integral, Fubini's theorem, Volumes and Areas, Change of variable in a double integral, special case: Polar coordinates, Triple integral, Applications, Change of variables in a triple integral, Surface area, Line integrals, Surface integrals.

UNIT V

Vector Calculus (12 Lectures)

Vector functions, Continuity and Differentiability of vector functions, Arc length for space curves, Unit tangent vector, Unit normal and Curvature to plane and space curves, Gradient, Directional derivatives, Vector fields, Divergence and Curl of a vector field, vector integrations, Green's Theorem (without Proof), Stokes' Theorem(without Proof), The divergence theorem(without Proof), verifications and applications.

Text Books:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

References:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.
5. Advanced Engineering Mathematics 3rd Edition,by R.K.Jain&S.R.K.Iyengar, Narosa publishers.

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I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A15201	**Applied Physics**	3	-	-	3

COURSE OBJECTIVES	
1	To make a bridge between the physics in school and engineering courses.
2	To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light through transparent dielectric waveguides along with engineering applications.
3	To enlighten the concepts regarding the bulk response of materials to the EM fields and their analytical study in the back-drop of basic Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications
4	To get an insight into the microscopic meaning of conductivity, classical and quantum free electron models, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors.
5	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
6.	To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano and smart materials, their properties and applications in modern emerging technologies are to be elicited.

COURSE OUTCOMES	
CO1	The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fiber optics.
CO2	Basics of Electromagnetic fields are focused along with the understanding of quantum mechanical picture of subatomic world.
CO3	The discrepancies between the classical estimates and laboratory observations of electron transportation phenomena are successfully explained by free electron theory and band theory. The physical properties exhibited by materials would be lifted through the understanding of properties of semiconductors.
CO4	The dielectric and magnetic response of materials are focused.
CO5	The importance of superconducting materials, nanomaterials and smart materials along with their engineering applications are well elucidated.

UNIT 1:PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics*:* Introduction to interference – Colours in thin films – Newton's Rings – Michelson interferometer – Fraunhofer diffraction due to single slit, double slit – Diffraction grating(Qualitative).

Lasers*:* Introduction – Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction–Principle of optical fiber –Numerical aperture and acceptance angle – V-Number - Types of optical fibers – Optical fiber communication system – Attenuation and losses in optical fibers – Applications of optical fibers.

UNIT 2: ELECTOMAGNETIC FIELDS AND QUANTUM MECHANICS

Electromagnetic Fields: Scalar and Vector Fields – Electric Potential – Gradient, Divergence of fields - Gauss and Stokes theorems - Derivations of Maxwell's equations.

QuantumMechanics*:* Black Body radiation – Dual nature of radiation – Schrodinger's time independent wave equation – Significance of wave function – Particle in a one dimensional infinite potential well.

UNIT 3: FREE ELECTRON THEORY AND SEMICONDUCTORS

Freeelectrontheory: Classical free electron theory – Sources of electrical resistance – Equation for electrical conductivity – Quantum free electron theory – Fermi-Dirac distribution – Kronig-Penny model (qualitative) – Origin of bands in solids – Effective mass.

Semiconductorphysics*:* Introduction –Direct and Indirect band gap semiconductors – Drift & diffusion currents – Einstein's equation – Continuity equation – Hall Effect.

UNIT 4: **DIELECTRICS AND MAGNETIC MATERIALS**

Dielectrics*:* Introduction – Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-Mosotti equation – Piezoelectricity – Ferro electricity – Dielectric strength, loss and breakdown.

Magneticmaterials*:* Introduction – Basic definitions – Origin of magnetic moment – Classification of magnetic materials – Hysteresis – Soft and hard magnetic materials – Applications of magnetic materials.

UNIT 5: **ADVANCED MATERIALS**

Superconductors*:* Introduction – Properties of superconductors – Meissner effect– Type I and type II superconductors – ac and dc Josephson effects – BCS theory (qualitative) – High T_c superconductors – Applications of superconductors.

Nanomaterials: Introduction – Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic – Applications of nanomaterials.

SmartMaterials: Shape Memory Alloys: Definition – Two phases – One way and two way memory effect – Pseudo elasticity – Applications of shape memory alloys.

Text books:

1. Engineering physics – D.K. Battacharya and PoonamTandon, Oxford University press.
2. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co.

References:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Introduction to modern optics – Grant R Fowles
3. A text book on Optics – Brijlal&Subramanyam
4. Semiconductor physics and devices- Basic principle – Donald A, Neamen, McGraw Hill
5. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley
6. Shape Memory Alloys-Modeling and Engg. Applications – C Lagoudas, Springer
7. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers
8. Engineering Physics – S.O.Pillai, New Age Publications
9. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
10. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
11. Engineering Physics – M. Arumugam, Anuradha Publications

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I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
15A10101	**Environmental Studies**	3	-	-	3

COURSE OBJECTIVES	
1	To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

COURSE OUTCOMES	
CO1	Critical Thinking: demonstrate critical thinking skills in relation to environmental affairs.
CO2	Communication: demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of contexts.
CO3	Interdisciplinary Synthesis: demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns
CO4	Ecological Literacy: demonstrate an awareness, knowledge, and appreciation of the intrinsic values of ecological processes and communities
CO5	Sustainability: demonstrate an integrative approach to environmental issues with a focus on sustainability

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

ECOSYSTEMS : Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological sucession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-soports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered

and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION : Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT : Causes**,** effects and control measures of urban and industrial wates – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT : From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

HUMAN POPULATION AND THE ENVIRONMENT : Population growth, variation among nations. Population explosion – Family Welfare Proggramme. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc..

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Pubilishers.
3. Environmental Studies by Benny Joseph, TMH Pubilishers

References:

1. Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company
2. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, CengagePubilications.
3. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
4. Comprehensive Environmental studies byJ.P.Sharma, Laxmi publications.
5. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

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I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A10301	**Engineering Drawing**	1	1	3	3

COURSE OBJECTIVES	
1	To draw and understand the practical importance of geometrical constructions.
2	To understand the representation of the regular planes and solids in first angle of projections

COURSE OUTCOMES	
CO1	Student will be familiar with the BIS conventions and dimensions
CO2	Student will be familiar with the positions of points and straight lines under different cases
CO3	Student will be able to represent regular planes and solids on the drawing sheet for various cases
CO4	Student can draw the development for regular solids
CO5	Student will familiarize with the 2D and 3D projections of various figure

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance Drawing Instruments and their Use – BIS Conventions in drawing and Lettering.

Curves used in practice:

a) Conic sections including the Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

Principles of orthographic projection, I and III angle projections –Conventions –Projections of points.

UNIT II

Projection of lines inclined to both planes –traces, Projection of plane figures inclined to both planes.

UNIT III

Projection of simple solids inclined to both planes.

UNIT IV

Sections and Developments: Sections and Sectional views of Regular solids –Prism, Cylinder, Pyramid, Cone – True shapes.

UNIT V

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines-Isometric projection of spherical parts.

Text Books:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai.

References:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers.
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, John&john.

Method of Evaluation:

The distribution shall be 40 marks for Internal Evaluation and 60 marks for the External Evaluation.

Internal mid examination for 30 marks and internal assessment for 10 marks shall be awarded for internal evaluation.

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I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A10501	**Problem Solving and Computer Programming**	3	-	-	3

COURSE OBJECTIVES	
1	To understand the various steps in program development.
2	To understand the basic concepts in C Programming Language.
3	To learn how to write modular and readable C Programs
4	To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
5	To understand the notations used to analyze the Performance of algorithms.
COURSE OUTCOMES	
CO1	Develop flowcharts, algorithms for given complex problems.
CO2	Analyze basic programming constructs.
CO3	Write C programs for real world problems.
CO4	Implement C programming by using various control structures.
CO5	Appreciate coding standards and best practices for program development.

UNIT - I

Introduction: Programs and Programming, Programming Languages, Compiler, Interpreter, Loader and Linker, Program Execution, Classification of Programming, Structured Programming Concept, Algorithms, Flowcharts, System Developments.

Fundamentals Algorithms: Exchange the Values between two variables, Counting, Summation of set of numbers, Factorial Computation, Generation of the Fibonacci sequence, Reversing the digits of a integer.

Basics Of C: Introduction**,** Developing Programs in C, A Simple C program, Parts of C Program Revisited.

UNIT – II

Structure of C: Structure of a C Program, Concept of a Variable, Data Types in C, Program Statements, Declaration, Tokens, Operators and Expressions, Type conversion in C.

Input and Output: Introduction, Basic Screen and Keyboard I/O in C, Non-Formatted Input and Output, Formatted Input and Output Function.

Control Statements: Introduction, Specifying Test Condition for Selection and Iteration, Writing Test Expression, Conditional Execution and Selection, Iteration and Repetitive Execution. Nested Loops.

UNIT – III

Arrays And Strings: Introduction, One-Dimensional Array, Strings, Multidimensional Arrays, Arrays of Strings.

Function: Introduction, Concept of Functions, Using Functions, Call by Value Mechanism, Working with Functions, Passing Arrays to Functions, Scope and Extent, Inline Function, Recursion.

UNIT - IV

Factoring Methods: Finding Square root of a Number, The Smallest Deviser of an Interger, The GCD of Two Integers, Generating Prime Numbers.

Pointers – Introduction, Understanding Memory, Address Operator, Pointer, Void Pointer, Null Pointer, Use of pointer, Arrays and Pointers, Pointers and string, Pointers and string, Pointers to pointers, Array of pointers, Pointers to Function, Dynamic Memory Allocation.
Introduction to Data Structures, Single Linked List.

UNIT – V

User-Defined Data Types and Variables: Introduction, User-defined Data Types, Structures, Union, Enumeration Types.

Files in C: Introduction, Using Files in C, Working with text Files, Working with Binary Fields, Direct File Input and Output, Files of Records, Random Access to Files of Records.

Text Books:

1. Programming in C, PradipDey, ManasGhosh, Second Edition, OXFORD,
2. How to Solve it by Computer by R.G. Dromey, Pearson.

References:

1. Programming in C and Data Structures, Jeri R. Hanly, Elliot B. Koffman, Ashok Kamthane and A.AnandaRao, Pearson Education.
2. Value Range analysis of C programs by simon, Axel by New Age International Publishers.
3. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
4. Programming in C – Stephen G. Kochan, III Edition, PearsonEductaion.
5. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition Education / PHI
6. C Programming & Data Structures,E.Balagurusamy,TMH.
7. Complete Reference – C, Herbert Schildt,TMH.

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I B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A15202	**Applied Physics Laboratory**	-	1	3	2

COURSE OBJECTIVES	
1	The objective of this course is to make the students gain practical knowledge to correlate with the theoretical studies.
2	To develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.
3	To train engineering students on basis of measurements and the instruments
4	To equip the students with practical knowledge in electronic, optics, and heat experiments

COURSE OUTCOMES	
CO1	On Completion of this course, students are able to – Develop skills to impart practical knowledge in real time solution.
CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
CO3	Understand measurement technology, usage of new instruments and real time applications in engineering studies.
CO4	The student will be able to analyze the physical principle involved in the various instruments, also relate the principle to new application.
CO5	The various experiments in the areas of optics, mechanics and thermal physics will nurture the students in all branches of Engineering.

LIST OF EXPERIMENTS

Any TEN of the following experiments have to be performed during the SEMESTER

1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method.
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method.
4. Determination of radius of curvature of lens by Newton's rings.
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber.
9. Meldes experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Hall effect : Determination of mobility of charge carriers in semiconductor
14. B-H curve
15. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
16. Determination of dielectric constant and Curie temperature of a ferroelectric material.

Note: Out of 10 experiments, two experiments will be performed using virtual laboratory

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I B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A10502	**Computer Programming Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To work with the compound data types
2	To explore dynamic memory allocation concepts
3	Able to design the flowchart and algorithm for real world problems
4	Able to write C programs for real world problems using simple and compound data types
5	Employee good programming style, standards and practices during program development

COURSE OUTCOMES	
CO1	Translate algorithms in to programs
CO2	Code and debug programs in C program language using various constructs.
CO3	Formulate problems and implement algorithms in C.
CO4	Able to use different data types in a computer program

LIST OF EXPERIMENTS

Week-1
1) Write a C program to make the following exchange between the variables a-> b -> c->d - > a
2) Write a C program to carry out the arithmetic operations addition, subtraction, multiplication, and division between two variables
3) Write a C program for printing prime numbers between 1 and n.

Week-2
1) Write a C program to construct a multiplication table for a given number.
2) Write a program to reverse the digit of a given integer.
3) Write a C program to find the sum of individual digits of a positive integer.
4) Write a C program to calculate the factorial of a given number

Week-3
1) Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
2) Write a program to calculate tax, given the following conditions:
   a) If income is less than 1,50,000 then no tax.
   b) If taxable income is in the range 1,50,001 – 300,000 then charge 10% tax
   c) If taxable income is in the range 3,00,001 – 500,000 then charge 20% tax
   d) If taxable income is above 5,00,001 then charge 30% tax

Week-4

1) Write a program to print the calendar for a month given the first Week- day of the month.

Input the first day of the month (Sun=0,Mon=1,Tue=2,Wed=3,.....) :: 3

Total number of days in the month : 31

Expected output

Sun	*Mon*	*Tue*	*Wed*	*Thu*	*Fri*	*Sat*
-	-	-	*1*	*2*	*3*	*4*
5	*6*	*7*	*8*	*9*	*10*	*11*
12	*13*	*14*	*15*	*16*	*17*	*18*
19	*20*	*21*	*22*	*23*	*24*	*25*
25	*26*	*27*	*28*	*29*	*30*	*31*

2) Write a C program to find the roots of a quadratic equation

Week-5

1) Write a program to print the Pascal triangle for a given number
2) Write a C program to find the GCD (greatest common divisor) of two given integers
3) Write a C program to construct a pyramid of numbers.
4) Write C code to define a function cash_dispense, which takes an amount as its input, and returns the number of 1000, 500, 100, 50, 20, 10, 5, 2, 1 rupee denomination that make up the given amount

Week-6

1) Write C code to reverse the contents of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1]
2) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices
3) Write a program that will search and find out the position where the given key element exist in a user chosen array and print it as output.

Week-7

1) Write C code to compute the frequency table of survey responses given by 20 users. The survey responses range from 1 to 5 and are stored in an array. For example, 10 responses are stored in the array [1,1,5,2,3,3,5,5,2,2]. The frequency table will be as shown below:
   a. 1 = 2
   b. 2 = 3
   c. 3 = 2
   d. 4 = 0
   e. 5 = 3
2) Write a program to define a function to sort an array of integers in ascending order by using exchange sort.

Week-8

1) Write a C program to check whether a given string is a palindrome or not, without using any built-in functions.
2) Write a C program to determine if the given string is a palindrome or not by using string functions.
3) Write a function that accepts a string and delete the first character.
4) Write a function that accepts a string and delete all the leading spaces.

Week-9 Write a program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given string.

Week-10

1) Write a C program to define a union and structure both having exactly the same numbers using the sizeof operators print the sizeof structure variables as well as union variable
2) Declare a structure *time* that has three fields *hr, min, secs.* Create two variables,*start_time*and*end_time.* Input there values from the user. Then while *start_time* is not equal to *end_time* display GOOD DAY on screen.

Week-11

1) Write a program to read in an array of names and to sort them in alphabetical order. Use sort function that receives pointers to the functions strcmp, and swap, sort in turn should call these functions via the pointers.

2) Write a program to read and display values of an integer array. Allocate space dynamically for the array using the *malloc()*.
3) Write a program to calculate area of a triangle using function that has the input parameters as pointers as sides of the triangle.

Week-12

1) Two text files are given with the names text1 and text2. These files have several lines of text. Write a program to merge (first line of text1 followed by first line of text2 and so on until both the files reach the end of the file) the lines of text1 and text2 and write the merged text to a new file text3.
2) Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part**<n>** where n is the sequence number of the part file.

Reference Books:

1. Computer Science, A Structured Programming Approach Using C by Behrouz A. Forouzan& Richard F. Gilberg, Third Edition, Cengage Learning
2. C Programming A Problem-Solving Approach, Behrouz A. Forouzan& E.V. Prasad, F. Gilberg, Third Edition, Cengage Learning
3. Programming with C RemaTheraja, Oxford
4. "C Test Your Skills", Kamthane, Pearson Education
5. Programming in C: A Practical Approach, Ajay Mittal, Pearson
6. Problem solving with C, M.T.Somasekhara, PHI
7. C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press
8. Programming withc, Byron S Gottfried, Jitender Kumar Chhabra, TMH, 2011

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Subject Code	Title of the Lab	L	T	P	C
17A15502	**English Language Communication Skills Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2	To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
3	To provide opportunities for practice in using English in day to day situations
4	To improve the fluency in spoken English and neutralize mother tongue influence
5	To train students to use language appropriately for debate, group discussion and public speaking

COURSE OUTCOMES	
CO1	Better Understanding of nuances of language through audio- visual experience and be independent learners
CO2	The significance of paralinguistic features will be understood by the students and they will try to be intelligible.
CO3	Become good at Inter-personal skills
CO4	Achieve neutral accent and be free from mother tongue influence
CO5	Being an active participant in debates and group discussion, showing ability to express agreement, argument to summarize ideas to elicit the views of others and present own ideas;

UNIT- I
Phonetics – Introduction to Sounds of Speech – Vowels – Consonants – Phonetic Transcription & Orthographic Transcription
UNIT – II
Syllabification – Word Stress – Rules of word stress – Intonation – Falling tone and Rising tone
UNIT – III
Situational Dialogues – Role-play – Expressions in various situations – Self Introduction – Introducing others – Greetings – Apologies – Requests – Giving directions -Social and Professional etiquettes – Telephone Etiquettes
UNIT – IV
JAM – Describing Pictures, Photographs, Products, and Process – Talking about Wishes- Information Transfer.
UNIT – V
Debates - Group Discussions-1

MINIMUM REQUIREMENT FOR ELCS LAB:
The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:
   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):
Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB
ii) Headphones of High quality

SUGGESTED SOFTWARE:

1. Walden Infotech English Language Communication Skills.
2. Clarity Pronunciation Power – Part I (Sky Pronunciation)
3. Clarity Pronunciation Power – part II
4. LES by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian), 2012.
2. **A Course in Phonetics and Spoken English**, DhamijaSethi, Prentice-Hall of India Pvt.Ltd
3. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. **A Hand book for English Laboratories**, E.Sureshkumar, P.Sreehari, Foundation Books,2011
5. **English Pronunciation in Use. Intermediate & Advanced**, Hancock, M. 2009. CUP
6. **Basics of Communication in English**, Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
7. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
8. **English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011.

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I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A25501	**Technical Communication and Presentation Skills**	3	-	-	3

COURSE OBJECTIVES	
1	To develop awareness in students of the relevance and importance of technical communication and presentation skills.
2	To prepare the students for placements
3	To sensitize the students to the appropriate use of non-verbal communication
4	To train students to use language appropriately for presentations and interviews
5	To enhance the documentation skills of the students with emphasis on formal and informal writing

COURSE OUTCOMES	
CO1	Become effective technical communicators
CO2	Be job-ready and able to face interviews confidently
CO3	Sensitive use of non-verbal language suitable to different situations in professional life
CO4	Learn and use keys words, phrases and sentence structures making a mark in interviews and presentation skills
CO5	Effective writing skills with the ability to use different styles for different situations

SYLLABUS

UNIT I
Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

UNIT II
Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

UNIT III
Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

UNIT IV
Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

UNIT V
Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Text Books:

1. **Effective Technical Communication,** AshrifRizvi, TataMcGrahill, 2011
2. **Technical Communication** by Meenakshi Raman &Sangeeta Sharma,3rd Edition, O U Press 2015

References:

1.Communication Skills by Pushpalatha& Sanjay Kumar, Oxford Univsesity Press

2.Books on **TOEFL/GRE/GMAT/CAT/IELTS** by Barron's/DELTA/Cambridge University Press.2012.

3. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.

4. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.

5. **Successful Presentations** by John Hughes & Andrew Mallett, Oxford.

6. **Winning at Interviews** by Edgar Thorpe and Showick Thorpe, Pearson

7. Winning Resumes and Successful Interviews by MunishBhargava, McGraw Hill

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I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A25101	Mathematics – II	**2**	**2**	**-**	**3**

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms;partial differential equations.

COURSE OBJECTIVES	
1	To impart basic knowledge on Fourier series, Fourier transforms, Laplace Transforms, z-transforms and partial differential equations.
2	To develop skills in analyzing the problems, designing mathematical models,Fourier series, Fourier transforms, Laplace transforms, z-transforms and partial differential equations for the problems in engineering.

COURSE OUTCOMES	
After completion of the course a successful student is able to	
CO1	Acquire basic knowledge in (a) Fourier series and Fourier transforms (b) Fourier integrals (c) Laplace transforms and their applications (d) z- transforms and their applications (e) Solving partial differential equations (f) Heat transfer and wave motion
CO2	Develop skills in Analyzing the (a) Properties of Fourier series for a given function (b) Partial differential equations through different evaluation methods (c) Difference equations through z – transforms (d) Engineering systems and processes involving wave forms and heat transfer
CO3	Develop skills in designing mathematical models for (a) Problems involving heat transfer and wave forms (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations
CO4	Develop analytical skills in solving the problems involving (a) Fourier series and Fourier transforms (b) Laplace transforms (c) Z-transforms and difference equations (d) Heat transfer and wave motion
CO5	Use relevant transformation techniques for (a) Obtaining Fourier transforms for different types of functions (b) Laplace transforms (c) Z- transforms (d) Partial differential equations

UNIT- I :
FOURIER SERIES (7 periods)
Fourier series: Determination of Fourier coefficients (Euler's formulae),Fourier series of even and odd functions, convergence of Fourier series (Dirichlet conditions), Half-range Fourier sine and cosine expansions, Parseval's formula, Complex form of Fourier series.

UNIT- II:

FOURIER INTEGRALS AND FOURIER TRANSFORMS(8 periods)

Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms –properties, Inverse transform and finite Fourier transforms.

UNIT-III:

LAPLACE TRANSFORMS (12 periods)

Laplace transforms of standard functions. Properties of Laplace transform. First and second shifting Theorems. Laplace transforms of derivatives and integrals. Inverse transforms. Convolution theorem, inverse Laplace transforms by convolution theorem. Laplace transform of periodic functions, Step and Impulse functions, Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT-IV :

Z- TRANSFORMS (9 periods)

Z – transforms, inverse Z– transforms, damping rule, shifting rule, initial and final value theorems. Convolution theorem, Solution of difference equations by Z– transforms.

UNIT – V :

PARTIAL DIFFERENTIAL EQUATIONS (9 periods)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions ,Method of separation of variables , Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

References:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
4. Advanced Engineering Mathematics 3rd Edition,by R.K.Jain&S.R.K.Iyengar, Narosa publishers

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I B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A25301	**Applied Chemistry**	3	-	-	3

COURSE OBJECTIVES	
1	The Applied Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
2	The main aim of the course is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
3	The lucid explanation of the topics will help students to understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
4	The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.

COURSE OUTCOMES	
CO1	After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers, nanomaterials with their applications and engineering materials.
CO2	Understand the electrochemical sources of energy.
CO3	Understand industrially based polymers, various engineering materials.
CO4	Differentiation and uses of different kinds of photochemical reactions.

UNIT I :ELECTROCHEMISTRY

i) Review of electrochemical cells, Numerical calculations.

Batteries: Rechargeable batteries: Lead acid, Ni-Cd, Lithium Ion Batteries, Super capacitors Fuels cells: Fuel cell working principle, classification of fuel cells-Hydrogen-Oxygen and Methanol-Oxygen.

ii) Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii) Corrosion: Definition, types of corrosion, Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and catholic protection and electro and electroless plating. (10h)

UNIT II: POLYMERS

i) Introduction to polymers, Polymerization process, mechanism: cationic, anionic, free radical and coordination covalent.

Elastomers: Natural Rubber, process of natural rubber, vulcanization, Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, Buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons. Polydispersive index

ii) Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii) Liquid Crystals: Introduction, classification and applications

iii) Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications.(12h)

UNIT III: FUEL TECHNOLOGY

i) Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Beehive oven and Otto Hoffmann's by product oven processes.

ii) Liquid Fuels:Petroleum: Refining of Petroleum, Gasoline: Octane and cetane number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

iii) Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus.

Combustion: reaction of combustion and related problems.

iv)Nuclear Fuels: Controlled and uncontrolled reactions. Breeder reactor and Power reactors. (12h)

UNIT IV: CHEMISTRY OF ENGINEERING MATERIALS

i) Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators. Applications of electrical insulating materials (Gaseous, liquid and solid insulators)

ii) Semiconducting and Super Conducting materials-Principles and some examples

iii) Magnetic materials – Principles and types of magnetic materials-examples (9h)

UNIT V:NANOCHEMISTRY& COMPOSITE MATERIALS

i) Nanochemistry Introduction, nanomaterials, nanoparticles, nanostructure, supra molecular systems, nanotechnology applications, future perspective.

ii) Composite Materials: Classification of Composites materials, Constituents of Composite materials. Disperse Phase composite materials.

Glass fibre reinforced polymer composite and Carbon fibre reinforced polymer composite materials. Advantages and applications of Composites.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi.
2. A Text Book of Enigneering Chemistry, Jain and Jain, DhanapathiRai Publications, New Delhi

References:

1. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi
2. Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- AshimaSrivastavaf and N.N. Janhavi
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

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I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A25102	**Mathematical Methods**	**2**	**2**	**-**	**3**

COURSE DESCRIPTION:
Fundamentals of matrix theory; numerical solutions of equations curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OBJECTIVES	
1	To impart basic knowledge on ranks of matrices, systems of linear equations, numerical methods to solve algebraic and transcendental equations, differential equations, numerical differentiation and integration.
2	To develop skills in analyzing various numerical techniques, designing mathematical models, numerical techniques for engineering problems and fitting of curves to experimental data.

COURSE OUTCOMES	
After completion of the course a successful student is able to	
CO1	Acquire basic knowledge in (a) Finding the rank of matrices and analyzing them. (b) Solving algebraic and transcendental equations by various numerical methods. (c) Fitting of various types of curves to the experimental data. (d) Estimating the missing data through interpolation methods. (e) Identification of errors in the experimental data (f) Finding the values of derivatives and integrals through various numerical methods. (g) Solving differential equations numerically when analytical methods fail to hold.
CO2	Develop skills in analyzing the (a) Methods of interpolating a given data (b) Properties of interpolating polynomials and derive conclusions (c) Properties of curves of best fit to the given data (d) Algebraic and transcendental equations through their solutions (e) Properties of functions through numerical differentiation and integration (f) Properties of numerical solutions of differential equations
CO3	Develop skills in designing mathematical models for (a) Fitting geometrical curves to the given data (b) Solving differential equations (c) Constructing polynomials to the given data and drawing inferences.
CO4	Develop numerical skills in solving the problems involving (a) Systems of linear equations (b) Fitting of polynomials and different types of equations to the experimental data (c) Derivatives and integrals (d) Ordinary differential equations

CO5	Use relevant numerical techniques for (a) Diagonalising the matrices of quadratic forms (b) Interpolation of data and fitting interpolation polynomials (c) Fitting of different types of curves to experimental data (d) Obtaining derivatives of required order for given experimental data
CO5	: Use relevant numerical techniques for (a) Diagonalising the matrices of quadratic forms (b) Interpolation of data and fitting interpolation polynomials (c) Fitting of different types of curves to experimental data (d) Obtaining derivatives of required order for given experimental data

UNIT–I

MATRIX THEORY (11 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by elementary row operations. Solutions of linear system of equations. Eigen values, Eigen vectors and properties,Diagonalization.Quadratic form, reductions to canonical form using orthogonal transformation method and nature of Quadratic forms.

UNIT-II

NUMERICAL SOLUTIONS OF EQUATIONS AND CURVE FITTING (9 periods)

Solutions of Algebraic and Transcendental equations by Regulafalsi method, Newton – Raphson's method. Solution of linear simultaneous equation: Crout'striangularisation method, Gauss - Seidal iteration method.Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves.

UNIT- III

INTERPOLATION (7 periods)

Interpolation, difference operators and their relationships, Newton's forward and backward interpolation formulae, Lagrange's interpolation formula.Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT-IV

NUMERICAL DIFFERENTIATION AND INTEGRATION(7 periods)

Numerical differentiation using Newton's forward and backward formulae. Numerical integration using Trapezoidal rule, Simpsons $1/3^{rd}$ rule and $3/8^{th}$ rule.

UNIT- V

NUMERICAL SOLUTIONS OF DIFFERENTIAL EQUATIONS(11 periods)

Numerical solutions of first order Initial value problems using Taylor series method, Euler's, modified Euler's, Runge – Kutta method (4^{th}order only) and Milne's predictor – corrector method. Numerical solutions of Laplace equation using finite difference approximation.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

References:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
5. Advanced Engineering Mathematics 3^{rd} Edition,by R.K.Jain&S.R.K.Iyengar, Narosa publishers

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I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A20401	**Network Analysis**	2	2	-	3

COURSE OBJECTIVES	
1	To study about basic laws that govern flow of current, different sources of voltage and currents To understand basic concepts on basic RLC circuits and analyze.
2	To study and apply circuit theorems
3	To know the behavior of the steady states and transients states in RLC circuits.
4	To study the basic Laplace Transforms techniques and principles of coupling
5	To understand the two port network parameters & network functions

COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1	Analyze different electronic and electrical circuits by employing basic laws that govern flow of current.
CO2	Apply different network theorems to electrical circuits.
CO3	Analyze the RLC circuit behavior.
CO4	Understand basic principles of coupling.
CO5	Analyze two port networks with their equivalent representations using two port parameters.

UNIT I

Basic Circuit Analysis:

R-L-C Parameters, Voltage and Current, Independent and Dependent Sources, Kirchoff's Laws, Loop and Nodal methods of analysis of Networks with dependent and independent voltage and current sources.

Network Topology: Graph of a network, Concept of tree and co-tree, incidence matrix, f-circuit matrix and f-cutset matrix, Tie set and Cutset Matrices for planar networks.

UNIT II

Network reduction techniques: series, parallel, series-parallel, star-to-delta, delta-to-star transformation, source transformation.

Network Theorems: Thevenin's,Novton's, Superposition Theorem,Maximum power transfer, Reciprocity Theorem, Milliman, Miller and Tellegan'sTheorems.

UNIT III

Transient Analysis:

Transient analysis of RC, RL and RLC Circuits, Circuits with switches, step response, 2^{nd} order series and parallel RLC Circuits. Network Analysis using Laplace transform techniques, step, impulse and exponential excitation,

UNIT IV

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, j-notation, complex and polar forms of representation.

Coupled Circuits: Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT V

Two Port Networks: Two port network parameters, Z, Y, ABCD, h and g parameters, Relationship between parameter sets, Interconnection of two port networks. Characteristic impedance, Image transfer constant, image and iterative impedance.

Network functions: Driving point and transfer functions – using transformed (S) variables, Poles and Zeros.

Text Books:

1. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
2. M E Van Valkenburg, "Network Analysis", Prentice-Hall of India Pvt Ltd, New Delhi

References:

1. Linear circuit analysis (time domain phasor and Laplace transform approaches)- 2nd edition by Raymond A. DeCarlo and Pen-Min-Lin, Oxford University Press-2004.
2. Network Theory by N.C.Jagan&C.Lakshminarayana, B.S. Publications.
3. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

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I B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A20402	**Electronic Devices**	3	-	-	3

COURSE OBJECTIVES	
1	Exposed to basics of semiconductor physics and electronic devices.
2	To introduce students structures, physical operations, and circuit applications of basic semiconductor devices.
3	To provide students a base for a further study of analog and digital electronics, and to develop the ability to analyze and design electronic circuits.

COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1	Acquire knowledge about semiconductor physics.
CO2	Analyze the operating principles, characteristics and applications of electronic devices like diodes, transistors and special purpose devices.
CO3	An ability to understand the essence of the diode functions, grasp the techniques for the analysis of diode circuits through modeling the diode characteristics.
CO4	An ability to analyze the BJT terminal characteristics.
CO5	An ability to develop a high degree of familiarity with the MOSFET: its physical structure and operation, terminal characteristics.

UNIT I

Semiconductor Basics: Energy band in solids (metal, semiconductor and insulators), concept of effective mass, density of states, carrier concentration at normal equilibrium in intrinsic semiconductors, derivation of Fermi level for intrinsic semiconductors, donors, acceptors, majority carriers (electrons and holes), dependence of Fermi level on temperature and doping concentration.

Carrier Transport Phenomena: Carrier Drift, Mobility, Resistivity, Hall Effect, Diffusion Process, Einstein Relation, Current Density Equation, Carrier Injection, Generation And Recombination Processes, Continuity Equation.

UNIT II

P-N Junction Diode: Formation of Depletion Layer, Space Charge at a Junction, Derivation of Electrostatic Potential Difference at Thermal Equilibrium, Depletion Width and Depletion Capacitance of an Abrupt Junction. Concept of Linearly Graded Junction, Derivation of Diode Equation and I-V Characteristics..

UNIT III

Bipolar Junction Transistors (BJT): PNP and NPN Transistors, Basic Transistor Action, Emitter Efficiency, Base Transport Factor, Current Gain, Energy Band Diagram of Transistor in Thermal Equilibrium, Quantitative Analysis of Static Characteristics (Minority Carrier Distribution and Terminal Currents), Base Width Modulation, Modes of operation, Input and Output Characteristics of CB, CE and CC Configurations.

UNIT IV

Field Effect Transistors: JFET, Construction, Idea of Channel Formation, Pinch-Off and Saturation Voltage, Current-Voltage Output Characteristics. MOSFET, types of MOSFETs, Circuit symbols, Working and Characteristic curves of Depletion type MOSFET (both N channel and P

Channel) and Enhancement type MOSFET (both N channel and P channel), Input and Output Characteristics of CS,CD and CG Configurations, Complimentary MOS (CMOS).

UNIT V

Special Purpose Devices:

Zener and Avalanche Junction Breakdown Mechanism.Basic construction, working and characteristics of Zener diode, Tunnel diode,varactor diode, UJT, SCR, Diac, Triac, LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

Text Books:

1. S. M. Sze, Semiconductor Devices: Physics and Technology, 2ndEdition, Wiley India edition.
2.Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory" Pearson Prentice Hall.
3. J. Millman, C. Halkias, "Electronic Devices and Circuits", TataMc-Graw Hill, Second Edition

References:

1. Donald A Neaman, "Semiconductor Physics and Devices", Third Edition, Tata McGrawHill Inc.
2. Ben G Streetman and S. Banerjee, Solid State Electronic Devices, Pearson Education
3. Allen Mottershead, Electronic Devices And Circuits: An Introduction, PHI Learning, New Delhi.
4. David A.Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press,

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I B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A25302	**Applied Chemistry Lab**	-	1	3	2

COURSE OBJECTIVES	
1	Will learn practical understanding of the redox reaction.
2	Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention.
3	Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus toengineer these to suit diverse applications.
4	Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

COURSE OUTCOMES	
CO1	Would be confident in handling energy storage systems and would be able combat chemical corrosion.
CO2	Would have acquired the practical skill to handle the analytical methods with confidence.
CO3	Would feel comfortable to think of design materials with the requisite properties.
CO4	Would be in a postion to technically address the water related problems.

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Copper by Iodometry
5. Estimation of Iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Acidity and Alkalinity of Water
7. Determination of pH of various water samples.
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromite indicator (Mohrs method)

Text Books:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – SM Enterprises Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera.

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I B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A23501	**Engineering & IT Workshop**	-	1	3	2

ENGINEERING WORKSHOP:

COURSE OBJECTIVES	
1	The objective of this subject is to provide the basic concepts about the engineering workshop trades like Carpentry, Fitting etc.
2	Gain knowledge of the use of various workshop tools and make models in the respective trades.
3	Exposure to power tools

COURSE OUTCOMES	
CO1	Student will be aware of the safety aspects in using the tools
CO2	Student will be able to use the tools for the preparation of models in respective trades of engineering workshop.
CO3	Precautions in making the models will be known by the student.
CO4	Student will be aware of the usage of the power tools for various purposes.
CO5	Knowledge about the measuring instruments will be achieved.

1. TRADES FOR EXERCISES:
At least 2 Exercises in each of the following trades :

1. Carpentry
2. Fitting
3. House-wiring
4. Black Smithy
5. Tin smithy
6. Power Tools Demonstration

TEXT BOOK:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech Publishers.

IT WORKSHOP:

COURSE OBJECTIVES	
1	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
2	To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
3	To learn about Networking of computers and use Internet facility for Browsing and Searching
COURSE OUTCOMES	
CO1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use
CO2	Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel
CO3	Prepare Slide presentations using the presentation tool
CO4	Interconnect two or more computers for information sharing
CO5	Access the Internet and Browse it to obtain the required information

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and

tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

References:

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

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I B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A20403	**Electronic Devices Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To provide exposure to the students with hands on experience on basic engineering practices in electronics engineering.
2	Understand the nature and scope of modern electronics.
3	To study basic electronic components.
4	To observe characteristics of electronic devices
COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1	Measure voltage, frequency and phase of any waveform using CRO.
CO2	Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
CO3	Understand the specifications sheets of different electronic devices.
CO4	Analyze the characteristics of different electronic devices such as diodes, transistors etc.

LIST OF EXPERIMENTS

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments

1. P-N Junction Diode Characteristics
2. Zener Diode Characteristics
3. Common Emitter input-output Characteristics
4. Common Base input-output Characteristics
5. Common Collector input – output characteristics
6. FET Characteristics (CS Configuration)
7. MOSFET Characteristics
8. SCR Characteristics
9. TRIAC Characteristics
10. UJT Characteristics
11. Characteristics of Photonic devices

Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards, Connecting Wires

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II B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A35103	Complex Variables and Special Functions	2	2	-	3

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.

COURSE OBJECTIVES	
1	To impart basic knowledge on Beta and Gamma functions, Bessel function, Analytic functions, complex integration and power series residue theorem, Mappings of functions of complex variables.
2	To develop skills in analyzing problems, designing mathematical models, Skills in Beta and Gamma functions, analytic functions, integral formulae,Residue theorem, conformal mappings for engineering problems.

COURSE OUTCOMES	
After the completion of the course, a successful student is able to	
CO1	Acquire knowledge in (a) Beta and Gamma functions (b) Expressing complex functions in power series (c) Differentiation and integration of complex functions (d) Conformal mappings and bilinear transformations (e) Expressing complex functions in terms of graphs and power series
CO2	Develop skills in Analyzing the (a) The properties exhibited by complex functions in Argand plane (b) Properties of real integrals through complex variable techniques (c) The properties of improper integrals through residue theory (d) Conformal transformations of complex valued functions for inferences (e) The properties of complex functions by expressing them in power series and graphs
CO3	Develop skills in designing mathematical models involving (a) Integrals of complex variable functions (b) Improper integrals using beta and gamma functions (c) Residue theory of complex functions (d) Power series expansions of complex variable functions (e) Transformations of complex variable functions (f) Fluid flow patterns and flux functions.
CO4	Develop analytical skills in providing solutions for problems involving (a) Fluid, Electrical and Magnetic Potential functions (b) Integration of complex functions (c) Improper real integrals
CO5	Use relevant Complex variable techniques for (a) Residues and integrals of complex functions. (b) Improper real integrals through complex functions (c) Techniques of Beta and Gamma functions to improper integrals

UNIT I

SPECIAL FUNCTIONS (9 periods)

Beta and Gamma functions - Properties - Relationship between Beta and Gamma functions- Evaluation of improper integrals. Series Solutions of ordinary differential equations (Power series and Frobenius Method). Bessel & Legendre function-Orthogonality -Generating function (without proof) - Recurrence relations, Rodrigue's formula.

UNIT II

ANALYTIC FUNCTIONS (9 periods)

Function of a Complex Variable - Limits and Continuity of functions, uniform continuity, Differentiability and Analyticity – Cauchy Riemann equations (both Cartesian and polar) - Conjugate and harmonic conjugate functions - Milne Thompson method-Potential functions.

UNIT III

COMPLEX INTEGRATION AND POWER SERIES (9 periods)

Line integral - Evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem (without proof) - Cauchy's integral formula - Derivatives of analytic function - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT IV

RESIDUE THEOREM (9 periods)

Zeros and Singularities – Types of singularities - Residues – Evaluation of Residues at poles- Pole of order m - Residue theorem - Evaluation of integrals using residue theorem – Evaluation of improper and real integrals of the type:

i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ ii) $\int_{-\infty}^{\infty} f(x)dx$ iii) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT V

CONFORMAL MAPPING (9 periods)

Definitions and examples, Translation, Rotation, Inversion. Mappings defined by $w = e^z, \log z, z^2, \sin z, \cos z$. Bilinear transformation - Properties - Fixed points - Cross ratio - Invariance of circles under bilinear transformation - Determination of bilinear transformation using three given points.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher

References:

1. Mathematics III by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Advanced Engineering Mathematics, Peter V.O'Neil, CENGAGE publisher.
3. Advanced Engineering Mathematics by M.C. Potter, J.L. Goldberg, Edward F.Aboufadel, Oxford.
4. Advanced Engineering Mathematics 3rd Edition, by R.K.Jain & S.R.K.Iyengar, Narosa publishers

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II B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A30401	**Probability Theory and Stochastic Processes**	2	2	-	3

COURSE OBJECTIVES	
1	To gain the knowledge of the basic probability concepts and acquire skills in handling situations involving more than one random variable and functions of random variables.
2	To understand the principles of random signals and random processes
3	To be acquainted with systems involving random signals
4	To gain knowledge of standard distributions which can describe real life phenomena

COURSE OUTCOMES	
After completion of the course, student will be able to	
CO1	determine the temporal and spectral characteristics of random signal response of a given linear system.
CO2	learn how to deal with multiple random variables, conditional probability and conditional expectation, joint distribution and independence, mean square estimation.
CO3	understand the characterization of random processes and their properties.
CO4	to do analysis of random process and application to the signal processing in the communication system
CO5	Formulate and solve the engineering problems involving random processes

UNIT I

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, Bays' Theorem, Independent Events:

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

UNIT II

Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: TwoRandom Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT III

The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity,

(N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT IV

The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT V

Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.

Text Books:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", TMH, 4th Edition, 2001.
2. Athanasios Papoulis and S. UnnikrishnaPillai, "Probability, Random Variables and Stochastic Processes", PHI, 4th Edition, 2002.

References:

1. R.P. Singh and S.D. Sapre, "Communication Systems Analog & Digital", TMH, 1995.
1. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing",Pearson Education, 3rd Edition.
3. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis", Oxford, 3rd Edition, 1999.

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II B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A30402	**Electronic Circuits - I**	3	-	-	3

COURSE OBJECTIVES	
1	To familiarize with the characteristics of non- linear wave shaping circuits for various inputs
2	To familiarize with the biasing of MOSFET and BJT.
3	To perform analysis of MOSFET and BJT amplifiers at low & high frequencies
4	To perform analysis of cascade, cascade and darlington amplifiers.

COURSE OUTCOMES	
Students will be able to	
CO1	Develop the ability to analyze and design analog electronic circuits using discrete components
CO2	design and analyze different rectifier circuits using p-n junction diodes, voltage regulator using zener diode and biasing circuits for MOSFET and BJT.
CO3	Analyze and design clipper and clamper citcuits.
CO4	analyze and design MOSFET and BJT amplifiers at low frequencies & high frequencies.
CO5	Design and analyze multistage amplifiers.

UNIT I

Diode Applications: Rectifiers and filter circuit: Half wave rectifier, Full wave rectifier, bridge rectifier and their analysis, L,C and Pi filters, Zener diode as regulator, Series and shunt diode clippers, Clipping at two independent levels, Clamping operation , Clamping circuit, Practical clamping circuits.

UNIT II

Transistor Biasing: Operating point, DC & AC load lines, Biasing - Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias stability, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors.

FET& MOSFET Biasing: DC load line and region of operation, Common-MOSFETs configurations, Design and analysis of various JFET & MOSFET biasing circuits.

UNIT III

BJT Amplifiers: Classification of Amplifiers – Distortion in 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.

UNIT IV

Different coupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, Frequency response of BJT amplifier – Analysis at low and high frequencies, The Hybrid-pi (π) – Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product.

UNIT V

FET Amplifiers: Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOS Amplifiers, MOS Small

signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

Text Books:

1. Millman and Halkias: Integrated Electronics, Tata Mc.Graw Hill, 2004.
2. R E Boylstead and L Nashelsky: Electronic Devices and Circuit Theory, 9/e, Pearson Education
3. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford

References:

1. David A. Bell, "Electronic Devices and Circuits", Oxford, Fifth Edition
2. Sedra and Smith: Microelectronic Circuits, 4/e, Oxford University Press 1998.
3. Donald A Neamen. : Electronic Circuit Analysis and Design, 3/e, Tata Mc.Graw Hill.
4. B. Razavi , "Fundamentals of Microelectronics", Wiley

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II B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A30403	**Signals and Systems**	3	-	-	3

COURSE OBJECTIVES	
1	To study about signals and systems.
2	To do analysis of signals & systems (continuous and discrete) using time domain & frequency domain methods.
3	To understand the stability of systems through the concept of ROC.
4	To know various transform techniques in the analysis of signals and systems

COURSE OUTCOMES	
CO1	Classify the signals as Continuous time and Discrete time
CO2	Analyze the spectral characteristics of signals using Fourier analysis.
CO3	Classify systems based on their properties and determine the response of LTI system using convolution
CO4	Identify system properties based on impulse response and Fourier analysis
CO5	Apply transform techniques to analyze continuous-time and discrete-time signals and systems

UNIT I

SIGNALS & SYSTEMS: Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Concepts of Convolution and Correlation of signals.
Analogy between vectors and signals-orthogonality, Mean Square error, Fourier series: Trigonometric & Exponential and concept of discrete spectrum.

UNIT II

CONTINUOUS TIME FOURIER TRANSFORM: Definition, Computation and properties of Fourier Transform for different types of signals and systems. Statement and proof of sampling theorem of low pass signals.

UNIT III

DISCRETE TIME FOURIER TRANSFORM: Definition, Computation and properties of Fourier Transform for different types of signals and systems.

UNIT IV

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. Energy and Power spectral densities.

UNIT V

LAPLACE TRANSFORM: Definition-ROC-Properties-Inverse Laplace transforms-the S-plane and BIBO stability-Transfer functions-System Response to standard signals-Solution of differential equations with initial conditions.

The Z–TRANSFORM: Derivation and definition-ROC-Properties-Poles and Zeros in Z-plane-The inverse Z-Transform-System analysis-Transfer function-BIBO stability-System Response to standard signals-Solution of difference equations with initial conditions.

Text Books:

1. B.P. Lathi, “Signals, Systems & Communications”, 2009,BS Publications.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, PHI, 2nd Edn.

References:

1. Simon Haykin and Van Veen, “Signals & Systems”, Wiley, 2nd Edition.
2. B. P. Lathi, “Linear Systems and Signals”, Second Edition, Oxford University press, 2008.
3. Michel J. Robert, “Fundamentals of Signals and Systems”, MGH International Edition, 2008.

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II B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A30205	**Electrical Technology**	3	-	-	3

COURSE OBJECTIVES	
Student can be able to know	
1	The constructional features of DC machines, different types of DC machines and their characteristic.
2	The constructional details of single phase transformer and their performance characteristics by conducting suitable tests.
3	The analysis of three phase balanced and unbalanced circuits, Three phase induction motors and their characteristics.
4	The constructional feature and operation of synchronous machines.

COURSE OUTCOMES	
After completing the course, the student should be able to do the following	
CO1	Able to calculate the e.m.f. generated on DC Generator also able to control speed of different DC motors.
CO2	Able to conduct open circuit and short circuit tests on single phase transformer for knowing their characteristics.
CO3	Able to analyse three phase circuits, three induction motor operating principle and know their torque slip characteristics.
CO4	Able to thorough knowledge on synchronous machine with which he/she can able to apply the above conceptual things to real-world problems and applications.

UNIT I DC GENERATORS

D.C. Generators – Principle of Operation – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators- Applications

UNIT II D.C. MOTORS

D.C Motors – Principle of Operation – Back E.M.F. –Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors-Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Three Point Starter-Losses – Constant & Variable Losses – Calculation of Efficiency - Swinburne's Test.

UNIT III THREE PHASE A.C. CIRCUITS & SINGLE PHASE TRANSFORMERS

Introduction - Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.
Single Phase Transformers- Constructional Details- Emf Equation - Operation on No Load and on Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency-Regulation-OC and SC Tests - Predetermination of Efficiency and Regulation.

UNIT IV 3-PHASE INDUCTION MOTORS

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines- - Principle of Operation – Slip- Rotor Emf and Rotor Frequency - Torque Equation- Torque Slip Characteristics.

UNIT V SYNCHRONOUS MACHINES

Principle And Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Voltage Regulation by Synchronous Impedance Method- Theory of Operation of Synchronous Motor.

Text Books:

1. Electric Machines –by I.J.Nagrath & D.P.Kothari,Tata Mc Graw Hill, 7th Edition.2005
2. Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.

References:

1.Fundamentals of Electric Machines by B. R. Gupta, Vandana singhal, 3rd Edition, New age international Publishers.
2. Electromachanics – III by S. Kamakashiah, overseas publishers Pvt Ltd.
3. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.

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II B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A30404	**Electronic Circuits – I Lab**		1	3	2

COURSE OBJECTIVES	
1	To perform the analysis, design, and test of various electronic circuits.
2	Use hardware/software tools to characterize the behavior of circuits.

COURSE OUTCOMES	
Students will be able to	
CO1	Design, simulate and test diode as a rectifier, clipper and clamper.
CO2	analyze, design, simulate and test the low frequency amplifier circuits using MOSFET, FET and BJT.
CO3	analyze, design, simulate and test the cascade, cascade and darlington amplifier circuits.
CO4	write and prepare a lab report that details design procedures and experimental results.
CO5	work in a team using available resources to design circuits to meet a given specification

Note: The students are required to design the electronic circuit and they have to perform the analysis through simulator using Multisim/ Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory**.**

LIST OF EXPERIMENTS:

1. Rectifiers

a) To construct half wave, full wave & bridge rectifiers with and without filters - Calculation of ripple factors.

b) Simulation of rectifiers and trace their output waveforms with and without filters

2. Clipper & Clamper circuits using diodes

(i) To design, construct and observe output of Positive, negative, biased and combinational clippers

(ii) To design, construct and observe output of i. Positive, negative and biased clampers

3. Biasing Circuits

a. To design, construct and test different biasing circuits using BJTs, FETs & MOSFETs.

b. To simulate the biasing circuits and obtain the Q point

4. RC coupled amplifier

a. To design, construct and obtain frequency response of the circuit

b. To measure signal handling capacity, input and output impedance

c. Compare performance practically and through simulation

5. Emitter follower

a. To design, construct and obtain frequency response of the circuit

b. To measure signal handling capacity, input and output impedance

c. Compare practical and simulated results

6. Cascade Amplifier

a. To design, construct and obtain frequency response of a two stage RC coupled amplifier

b. To measure signal handling capacity, input and output impedance
c. Compare performance practically and through simulation

7. Darlington pair
To design, construct and obtain frequency response practically and through simulation

8. Cascode amplifiers
To design, construct and obtain frequency response practically and through simulation

9. FET amplifier
a. To design, construct and obtain frequency response of the JFET amplifier circuits
b. To measure signal handling capacity, input and output impedance
c. Compare performance practically and through simulation

10. MOSFET amplifier
a. To design, construct and obtain frequency response of the MOSFET amplifier circuits
b. To measure signal handling capacity, input and output impedance
c. Compare performance practically and through simulation

Equipment required for Laboratory
Software:

i. Multisim/ Pspice/Equivalent Licensed simulation software tool
ii. Computer Systems with required specifications

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats, Decade Capacitance Boxes
6. Ammeters (Analog or Digital), Voltmeters (Analog or Digital)
7. Active & Passive Electronic Components
8. Bread Boards
9. Connecting Wires, CRO Probes etc.

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II B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A30405	Basic Simulation Lab	-	1	3	2

COURSE OBJECTIVES	
1	An ability to apply knowledge of mathematics, science, and engineering for the analysis and processing of signals and to generate various continuous and discrete time signals using MATLAB tool.
2	To apply the convolution theorem and correlation for continuous time signals.
3	To analyze a continuous time LTI/LTV systems using convolution.
4	An ability to design and conduct experiments on modulation techniques to analyze and interpret results.

COURSE OUTCOMES	
CO1	Recall various functions available in MATLAB for signal processing
CO2	Demonstrate the various operations on signals
CO3	Solve the response of a system by difference equation and transfer functions.
CO4	Analyze the system stability from root locus, Bode and Nyquist plots.
CO5	Students are able to understand the process of sampling the band limited continuous time domain signals

LIST OF EXPERIMENTS

(All Experiments are to be conducted)

1. Basic Operations on Matrices
2. Generation of various signals and sequences (periodic and aperiodic) such as unit impulse, unit step, square, sawtooth, 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 or sequence and real and imaginary parts of signal
5. Convolution between signals and sequences
6. Autocorrelation and cross correlation between signals and sequences
7. Verification of linearity and time invariance property of a given continuous/discrete system
8. Computation of unit sample, unit step and sinusoidal responses of given LTI system and verifying its physical realizability and stability properties
9. Gibbs Phenomenon
10. Finding the Fourier Transforms of given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace Transform
12. Locating Zero's and Pole's, and plotting the pole-zero maps in S-Plane and Z-Plane for given transfer functions
13. Generation of Gaussian noise (real and complex), computation of its mean, M.S. Values and its skew, kurtosis, and PSD, Probability Distribution Function.
14. Sampling theorem verification
15. Removal of noise by Autocorrelation/Cross correlation in a given signal corrupted by noise
16. Generation of random signals at a given data rate

17. LC resonant circuit Design and simulate an LC resonant circuit and obtain the frequency response, measure the quality factor.
18. Simulation of filters. design LPF/HPF/BPF/BEF, T / π, constant k/m derived /composite for the given cutoff frequency. Also simulate the phase and frequency response of the designed filter.

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II B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A30206	Electrical Technology Lab	-	1	3	2

COURSE OBJECTIVES	
To make the student learn about	
1	Experimental verification of theorems
2	Drawing current locus diagrams and Practical determination of two port network parameters.
3	The DC motors, DC Generators and know various characteristics, performance analysis of DC machines and speed control techniques of DC machines.
4	Various test conditions of single phase transformers.

COURSE OUTCOMES	
After completing the course, the student should be able to do the following	
CO1	Apply suitable theorems for circuit analysis and verify the results theoretically.
CO2	Experimental determination of two port network parameters, verify with theoretical , and knowing the performance of RLC circuits with help of locus diagrams.
CO3	Learn about DC motors, DC Generators and know various characteristics, performance analysis of DC machines and speed control techniques of DC machines.
CO4	Various test conditions of single phase transformers.

LIST OF EXPERIMENTS

PART-A

1. Verification of KVL and KCL.
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. Two Port Network Parameters – ABCD and H-Parameters.
5. Verification of Superposition and Reciprocity Theorems.
6. Verification of Maximum Power Transfer Theorem. Verification on DC, Verification on AC with Resistive and Reactive Loads.
7. 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. Load Test on Single Phase Transformer.

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II B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A45101	**Human Values and Professional Ethics (Audit Course)**	2	-	-	-

COURSE OBJECTIVES	
1	To bring awareness among engineering graduates on ethics, human values & obligations.
2	To understand the ethical theories and their application to work ethics.
3	To understand the risk and safety measurements to be taken in various engineering areas.
4	To know various codes of ethics used by professional bodies & to learn about professional responsibility as an engineer.
5	To identify the global issues & measures to control adversity.

COURSE OUTCOMES	
CO1	Develop awareness on ethics, human values & obligations related to Self, Family, Society and State.
CO2	Become morally and socially responsible.
CO3	As a social experimentalist they can ensure less hazards & can find out engineering solutions from the ethical platform.
CO4	Students Can know how to ensure safety by minimizing risk through detailed analysis & can plan to get Intellectual property Rights(IPR).
CO5	Can identify various global issues, moral & social responsibilities.

UNIT I HUMAN VALUES

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co-operation& Commitment – Empathy –Self Confidence Character – Spirituality- Obligations to Self, Family, Society and the State.

UNIT II ENGINEERING ETHICS

Senses of 'Engineering Ethics- Variety of Moral Issues – Types of Inquiry – Moral dilemmas – Moral Autonomy –Kohlberg's Theory- Gilligan's Theory- Consensus and Controversy – Models of Professional Roles- Theories about Right Action- Self interest - Customs and Religion –Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering As Social Experimentation – Framing the Problem – Determining the Facts – Codes of Ethics – Clarifying Concepts – Application Issues – Common Ground - General Principles – Utilitarian Thinking -Respect for Human beings.

UNIT IV ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk-Safety and the Engineer- Designing for the Safety- Intellectual Property rights (IPR).

UINIT V GLOBAL ISSUES

Globalization – Cross Culture Issues- Environmental Ethics – Computer Ethics – Computers as The Instrument of Unethical Behavior – Computers as the Object of Unethical Acts –

Autonomous Computers- Computer Codes of Ethics – Weapons Development - Ethics and Research- Moral & Social Responsibility- Code of Conduct.

Text Books:

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.Senthil Kumar-PHI Learning Pvt. Ltd-2009,Rs.129.

References:

1. "Human Values & Ethics", SK Chakraborty & D.Chakraborty, Himalaya Publishing House, Mumbai,2014,Rs.398.
2. "2006Human Values & Professional Ethics ", B.S.Raghava and Jayashree Suresh, S.Chand &co., New Delhi, 2012.Rs.175
3. "Human Values & Ethics in the Workplace", Glenn Martin, GP Martin Publishing, Australia, 2007.

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II B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A40401	**Electromagnetic Field Theory**	2	2	-	3

COURSE OBJECTIVES	
1	This course provides the foundational education in static electromagnetic fields, and time varying electromagnetic waves
2	To introduce the concepts of Electrostatics and Magnetostatics.
3	To develop an understanding of Electromagnetic Waves and their Propagation.

COURSE OUTCOMES	
Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:	
CO1	Analyze and solve the problems of electric and magnetic fields that vary with three dimensional spatial co-ordinates as well as with time.
CO2	Have an understanding of Maxwell's equations and be able to manipulate and apply them to EM problems
CO3	Become proficient with analytical skills for understanding propagation of electromagnetic waves in different media.

UNIT 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, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems

UNIT II

Biot-Savart 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

Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT IV

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Illustrative Problems.

UNIT V

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection,

Surface Impedance, Poynting Vector, and Poynting Theorem – Applications, Power Loss in a Plane Conductor, Illustrative Problems

Text Books:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics", Oxford Univ. Press, 4th ed., 2008.
2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics", TMH, 7th ed., 2006.

References:

1. John D. Krauss, "Electromagnetics", McGraw- Hill publications.
2. Electromagnetics, Schaum'sout line series, Second Edition, Tata McGraw-Hill publications, 2006.
3. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", PHI, 2nd
4. Edition, 2000.

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II B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A40402	**Switching Theory and Logic Design**	2	2	-	3

COURSE OBJECTIVES	
This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:	
1	To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
2	To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations
3	To implement simple logical operations using combinational logic circuits
4	To design combinational logic circuits, sequential logic circuits.
5	To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
6	To realize logic gates using diodes & transistors

COURSE OUTCOMES	
Upon completion of the course, students should possess the following skills:	
CO1	able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray and BCD.
CO2	able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions
CO3	able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger complex circuits.
CO4	able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits
CO5	able to design and realize logic gates using diodes & transistors

UNIT I

Number Systems and Switching Functions: Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT II

Minimization methods:

Introduction, The Minimization of switching function using theorem, The Karnaaugh Map Method-Up to Five Variable Maps, Don't Care Map Entries, Tabular Method,

Combinational Circuits: Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Decoders, Encoders and Code converters, Basic PLD's-ROM, PROM, PLA, PAL Realizations. Hazards and Hazard Free Relations

UNIT III

Introduction to Sequential Circuits: Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, Latches, Flip Flops: SR, JK, Race Around Condition in JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip-Flop , Timing and Triggering Consideration, Clock Skew, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers, Data Transmission in Shift Registers, Operation of Shift Registers, Shift Register Configuration, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation Of Asynchronous And Synchronous Counters.

UNIT IV

Sequential Circuits: Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity-bit Generator, Design of Asynchronous Counters, Design of Synchronous Modulo N –Counters.

UNIT V

Finite State Machines: 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.

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. Switching and Finite Automata Theory- ZviKohavi&Niraj K. Jha, 3rdEdition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3rd Edition.
3. Digital Systems Principles and Applications (8th Edition) - Ronald J. Tocci Neal S. Widmer, 8th edition

References:

1. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. PrakashRao, 2 Ed., 2008, TMH.
2. Switching Theory and Logic Design – A Anand Kumar, PHI,2013.
3. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & Sons Inc.
4. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
5. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier
6. Fundamentals of Logic Design- Charles H. Roth, CengageLEanring, 5th, Edition, 2004

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II B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A40403	**Electronic Circuits - II**	3	-	-	3

COURSE OBJECTIVES	
1	To familiarize with the feedback concept in amplifiers and stability issues
2	To perform analysis of oscillators, tuned and power amplifiers.
3	To familiarize with the operation and characteristics of multivibrators, time base generators and sweep circuits

COURSE OUTCOMES	
CO1	Analyze and design negative feedback amplifier circuits and oscillators
CO2	Analyze and design solid state power amplifier circuits
CO3	Analyze and design tuned amplifier circuits.
CO4	analyze the various multivibrator circuits
CO5	understand the principles of voltage time base generator circuits and sweep circuits .

UNIT – I

Feedback 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.

Oscillators: 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 – II

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.

UNIT – III

Tuned Amplifiers: Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading single Tuned amplifiers on Bandwidth, Effect of Cascading Double Tuned amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned amplifiers

UNIT – IV

Multivibrators: Analysis and Design of Bistable, Monostable, AstableMultivibrators and Schmitt trigger using Transistors.

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, Transistor Miller Time Base generator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators, Methods of Linearity improvement

UNIT – V

Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuits, 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.

Text Books:

1. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. PrakashRao, 2 Ed., 2008, TMH.
2. Solid State Pulse Circuits –David A. Bell, 4 Ed., 2002 PHI.
3. R E Boylstead and L Nashelsky: Electronic Devices and Circuit Theory, 9/e, Pearson Education

References:

1. Millman and Halkias: Integrated Electronics, Tata Mc.Graw Hill, 2004.
2. Sedra and Smith: Microelectronic Circuits, 4/e, Oxford University Press 1998.
3. Donald A Neamen. : Electronic Circuit Analysis and Design, 3/e, Tata Mc.Graw Hill.
4. B. Razavi , "Fundamentals of Microelectronics", Wiley
5. Sedra and Smith: Microelectronic Circuits, 4/e, Oxford University Press 1998.

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ELECTRONICS AND COMMUNICATION ENGINEERING
II B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A40404	**Networks and Transmission Lines**	2	2	-	3

COURSE OBJECTIVES	
The main objectives are:	
1	To understand the principle and concepts of resonance.
2	To design different types of filters and attenuators
3	To understand transmission line parameters, lossy and lossless lines, matching of transmission lines to their loads
4	To understand Smith Chart, Single and double stub matching and field analysis of transmission lines.

COURSE OUTCOMES	
Upon completion of the course, students will be able to	
CO1	analyze electrical circuits by employing principles of resonance.
CO2	design and analyze different types of filters & attenuators. and apply to real world applications.
CO3	determine the transmission line parameters for different lines, characterize the distortions and estimate the characteristics for different lines
CO4	analyze the RF Line features and design the same for effective impedance transformation.
CO5	apply the Smith Chart profile, sub matching features and gain ability for solving practical problems.

UNIT – I

Network Synthesis: Realizability concept, Hurwitz Property, positive realness, properties of positive real functions, Synthesis of RL, RC, LC driving point functions, Foster and Cauer forms.

Resonance: Series resonance and Parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for Various Parameters.

UNIT – II

Filters: Characteristic impedance of symmetrical networks - filter fundamentals, Design of filters: Constant K - Low Pass, High Pass, Band Pass, Band Elimination, m- derived sections - low pass, high pass composite filters.

Attenuators: Symmetrical and Asymmetrical attenuators, T-type attenuator, L-type attenuator Π-type attenuator, Lattice attenuator, Bridged-T attenuator, Twin – T attenuator.

UNIT – III

Transmission Line Theory: General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion - the distortion-less line - Loading and different methods of loading - Line not terminated in Z_0 - Reflection coefficient - calculation of current, voltage, power delivered and efficiency of transmission - Input and transfer impedance - Open and short circuited lines - reflection factor and reflection loss.

UNIT – IV

High Frequency Transmission Lines: Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and current on the dissipation-less line, Standing Waves, Nodes, Standing Wave Ratio - Input impedance of the dissipation-less line - Open and short circuited lines - Power and impedance measurement on lines - Reflection losses - Measurement of VSWR and wavelength.

UNIT – V

Impedance Matching In High Frequency Lines:

Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - Smith chart - Solutions of problems using Smith chart - Single and double stub matching using Smith chart.

Text Books:

1. John D. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition, 2012.
2. William H.Hayt, Jr.JackE.Kemmerly and Steven M.Durbin, " Engineering Circuit Analysis", McGraw Hill Science Engineering Seventh Edition, 2006
3. UmeshSinha, SatyaPrakashan, "Transmission Lines and Networks", 2001, Tech. India Publications

References:

1. M.E.Vanvalkenburg, "Network Analysis", 3rd Edition, PHI,2003
2. Sudarshan and Shyam Mohan, "Network Theory", TMH

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II B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A40207	**Control Systems Engineering**	3	-	-	3

COURSE OBJECTIVES	
To make the students learn about:	
1	Merits and demerits of open loop and closed loop systems; the effect of feedback
2	The use of block diagram algebra and Mason's gain formula to find the effective transfer function
3	Transient and steady state response , time domain specifications and The concept of Root loci
4	Frequency domain specifications, Bode diagrams and Nyquist plots & The fundamental aspects of modern control

COURSE OUTCOMES	
After completing the course, the student should be able to do the following:	
CO1	Evaluate the effective transfer function of a system from input to output using (i) block diagram reduction techniques (ii) Mason's gain formula
CO2	Compute the steady state errors and transient response characteristics for a given system and excitation
CO3	Determine the absolute stability and relative stability of a system
CO4	Derive state space model of a given physical system and solve the state equation

UNIT – I CONTROL SYSTEMS CONCEPTS

Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback Characteristics, Effects of positive and negative feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram reduction methods – Signal flow graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver.

UNIT-II TIME RESPONSE ANALYSIS

Step Response - Impulse Response - 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, integral, derivative Controllers, Design of P, PD, PI, PID Controllers.

UNIT – III STABILITY ANALYSIS

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. 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

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis.
Compensation techniques – Lag, Lead, Lead-Lag Compensators design in frequency Domain.

UNIT V STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from Schematic models, differential equations, Transfer function, block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models.

Text Books:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.
3. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell, Pearson.

References:

1. Control Systems Principles & Design 4th Edition, M.Gopal, Mc Graw Hill Education, 2012.
2. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John wiley and son's, 8th edition, 2003.
3. Control Systems 3rd Edition, Joseph J Distefano III, Allen R Stubberud & Ivan J Williams, Schaum's Mc Graw Hill Education.
4. Control System Design by Goodwin.

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II B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A40405	**Data Structures & Object Oriented programming**	3	-	-	3

COURSE OBJECTIVES	
1	The student will able to understand the different methods of organizing large amounts of data.
2	The student will know the applications and efficiently implement the different types of data structures like stacks, queues, linked list and trees.
3	The student will able to understand the basics object-oriented programming concepts.
4	The student will able to understand and apply the object oriented concept like Classes and Objects, encapsulation, Inheritance, Polymorphisms in C++

COURSE OUTCOMES	
At the end of this course	
CO1	Students shall have knowledge of storing and accessing data.
CO2	Student will be able to choose appropriate data structure as applied to specified problem definition.
CO3	Students will be able to understand the concepts of class and object and features of C++ Programming.

UNIT I

Introduction to Data Structure, Classification Data Structure, Primitive and Composite Data Structure, Time and Space Complexity of Algorithms. STACKS: Array implementation – Operations on stacks - Applications of Stack - Infix to Postfix Conversion, Evaluation of Postfix expression, Recursion. QUEUES: Array implementation - Operations on Queues -Queue Applications, Circular Queue.

UNIT II

LINKED LISTS- Singly Linked List: Implementation - Operations - Application - Representation of a Polynomial, Polynomial Addition - Doubly Linked List: Implementation –Operations – Circular linked lists. TREES: Binary Trees - Conversion of General tree to Binary Tree, binary search tree, Operations - Tree Traversals.

UNIT III

SORTING AND SEARCHING: Sorting concepts - Types - Insertion sort - Selection sort - Bubble sort - Merge sort - Quick sort - Heap sort - Searching concepts - Linear search - Binary search

UNIT IV

Introduction to C++ - Object-Oriented Programming Concepts - Review of constructs of C used in C++: Basic Language Elements, control structures, input and output statement, structure, unions, functions, pointers and arrays, preprocessor directives - Classes and Objects : Object Scope, Data Abstraction, Enforcing Data Encapsulation, 'this' Pointer, Dynamic creation of objects - Constructors and Destructors : The Default Constructor, The Destructor, Parameterized Constructors, Copy constructor.

UNIT V

Defining member functions, Methods and access modifiers, Accessing class data and methods, Friend class and friendly functions, Returning objects, Arrays of Objects - Function and Operator

Overloading : Function Overloading, Operator overloading - using friend function, Dealing with strings using operators, Converting data types, Inheritance, Virtual functions and Polymorphism, Templates, Exception Handling

Text Books:

1. Tanenbaum, (2005), "Data Structures Using 'C' ", Pearson education, New Delhi, 2nd ed.
2. E. Balagurusamy, "Data Structures using C" McGraw Hill Education India Pvt. Ltd., 2013
3. Ira Pohl, "Object-Oriented Programming Using C++", 2/e, Pearson Education, 2006.

References:

1. E. Balagurusamy, "Object Oriented Programming with C++", McGraw Hill Company Ltd., 2007.
2. Lipschutz & Lipson, (2006), "Data Structure using 'C' ", Tata McGraw-Hill, New Delhi.
3.Robert L. Kruse, (2005), "Data Structures and Program Design in 'C' ", Pearson education, New Delhi, 2nd ed.

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II B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A40406	**Electronic Circuits – II Lab**	-	1	3	2

COURSE OBJECTIVES	
1	Operate electronic test equipment and hardware/software tools to characterize the behavior of devices and circuits.
2	Design, construct and test amplifier circuits and interpret the results.
3	Design and Implement Multivibrators using Transistors.
4	Design negative feedback amplifier circuits and oscillators.

COURSE OUTCOMES	
CO1	Develop the ability to Design and implement discrete analog amplifiers to meet the given specifications.
CO2	Design and implement BJT/FET based harmonic and relaxation oscillators.
CO3	Implementation of Multivibrators, Waveform generators using OP Amps.
CO4	Develop the ability to design and implement analog subsystems based on discrete component design.
CO5	

Note: The students are required to design the electronic circuit and they have to perform the analysis through simulator using Multisim/ Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory**.**

LIST OF EXPERIMENTS:

1. Negative feedback amplifier

a. To design, construct and test response of i. voltage shunt ii. voltage series feedback amplifiers with and without feedback for the given specification

b. To compare their frequency response through simulation

2. RC Phase shift oscillators

To design, construct and test the

a. RC Phase shift oscillator b. Wien bridge oscillator for the given specification

3. Hartley and Colpitts oscillators

To design, construct and test the a. Hartley oscillator

b. Colpitts oscillator for the given specification

4. Class A power amplifier

To obtain the frequency Vs power and load Vs power characteristics

5. Class B complementary symmetry amplifier

To obtain the frequency Vs power and load Vs power characteristics

6. Astable multivibrator and Monostable multivibrator

a. To design, construct and observe output of a transistor astable multivibrator

b. To design, construct and observe output of a transistor monostable multivibrator

7. Bistable multivibrator and Schmitt trigger
To design, construct and observe output of a transistor bistable multivibrator and Schmitt trigger circuits

8. Time base generators
To construct and observe output waveforms of a Miller integrator and Bootstrap ramp generator

9. UJT saw tooth generator
To construct and observe output waveforms of a UJT sweep circuit

Equipment required for Laboratory
Software:
i. Multisim/ Pspice/Equivalent Licensed simulation software tool
ii. Computer Systems with required specifications
Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

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II B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A40407	**Data Structures Lab**	-	1	3	2

	COURSE OBJECTIVES
1	To write and execute programs to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.
2	To learn to write programs to implement various sorting and searching algorithms
	COURSE OUTCOMES
CO1	Able to identify the appropriate data structures and algorithms for solving real world problems.
CO2	Able to implement various kinds of searching and sorting techniques.
CO3	Able to implement data structures such as stacks, queues, Search trees, and hash tables to solve various computing problems.

LIST OF PROGRAMS

1. Introduction to pointers. Call by Value and Call by reference.
2. Introduction to Dynamic Memory Allocation. DMA functions malloc(), calloc(), free() etc.
3. Implement a program for stack that performs following operations using array.
   (a) PUSH (b) POP (c) PEEP (d) CHANGE (e) DISPLAY
4. Implement a program to convert infix notation to postfix notation using stack.
5. Write a program to implement QUEUE using arrays that performs following operations
   (a) INSERT (b) DELETE (c) DISPLAY

5. Write a program to implement Circular Queue using arrays that performs following operations.
   (a) INSERT (b) DELETE (c) DISPLAY
6. Write a menu driven program to implement following operations on the singly linked list.
   (a) Insert a node at the front of the linked list.
   (b) Insert a node at the end of the linked list.
   (c) Insert a node such that linked list is in ascending order.(according to info. Field)
   (d) Delete a first node of the linked list.
   (e) Delete a node before specified position.
   (f) Delete a node after specified position.
7. Write a program to implement stack using linked list.
8. Write a program to implement queue using linked list.
9. Write a program to implement following operations on the doubly linked list.
   (a) Insert a node at the front of the linked list.
   (b) Insert a node at the end of the linked list.
   (c) Delete a last node of the linked list.
   (d) Delete a node before specified position.
10. Write a program to implement following operations on the circular linked list.
    (a) Insert a node at the end of the linked list.
    (b) Insert a node before specified position.
    (c) Delete a first node of the linked list.
    (d) Delete a node after specified position.

10. Write a program which create binary search tree.
11. Implement recursive and non-recursive tree traversing methods inorder, preorder and postorder traversal.
12. Write a program to implement Insertion sort, Selection sort, Bubble sort, Merge sort, Quick sort and Heap sort
13. Write a program to implement Linear search and Binary search.

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III B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A35401	**Managerial Economics and Financial Analysis**	3	-	-	3

COURSE OBJECTIVES	
1	The objective of this course is to inculcate the basic knowledge to the students with the concepts of Economics & Demand to make them effective business decision makers.
2	To understand fundamentals of Production & Cost Concepts which is an important subject helps to the Technocrats to take certain business decisions in the processes of optimum utilization of resources.
3	To know the various types of Market Structures & pricing methods and its strategies & Trade Blocks.
4	To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5	To provide fundamental skills about accounting and to explain the process of preparing accounting statements & analysis for effective business decisions.

COURSE OUTCOMES	
CO1	Capable of analyzing fundamentals of Economics such as Demand, Elasticity & Forecasting methods
CO2	To apply production, pricing & supply concepts for effective business administration
CO3	Students can able to identify the influence of various markets, the forms of business organization and its International Economic Environment.
CO4	Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity.
CO5	Prepare and analyze accounting statements like income & expenditure statement, balance sheet apart from the fundamental knowledge, to understand financial performance of the business and to initiate the appropriate decisions to run the business profitably.

UNIT I: INTRODUCTION TO MANAGERIAL ECONOMICS&DEMAND

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Demand Analysis: Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting- Factors governing Demand Forecasting- Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of returns - Internal and External Economies of scale – **Cost& Break Even Analysis**: Cost concepts and Cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)- Managerial significance and limitations of Break- Even Analysis.

UNIT III: INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination -

Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship-Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment-Economic Liberalization – Privatization - Globalization- Trade Blocks (SAARC,EU,NAFTA,BRICS)-EXIM Policy-International Economic Environment.

UNIT IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Significance, Types of Capital- Components of Working Capital -Sources of Shot term and Long term Capital - Estimating Working Capital Requirements – Cash Budget-**Capital Budgeting** – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT V: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Accounting Concepts and Conventions-Introduction Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). ***Financial Analysis*****:** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios-Du Pont Chart.

Text Books:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Ahuja H.L Managerial economics. S.Chand, 3/e, 2013

References:

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

Data Books Required: Present Value Factors table.

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III B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A50401	Linear IC Applications	3	-	-	3

COURSE OBJECTIVES	
The main objectives of the course are:	
1	To introduce the basic building blocks of linear integrated circuits.
2	To teach the linear and non - linear applications of operational amplifiers.
3	To introduce the theory and applications of 555 timer, analog multipliers and PLL.
4	To teach the theory of ADC and DAC.
5	To introduce the concepts of waveform generation and introduce some special function ICs.
COURSE OUTCOMES	
On completion of this course, the students will be:	
CO1	able to learn about the operational amplifiers and its characteristics as well as various types of op-amps.
CO2	acquire the ability to design and test practical circuits for amplifiers, filters and oscillators.
CO3	able to analyze the operation of comparators, data converters and implementation of the same.
CO4	able to learn the functioning of PLL, VCO, V-I, I-V converters, analog multipliers and implement them for suitable applications.

UNIT I

Operational Amplifier

Basic BJT/FET Differential amplifiers – Constant current source – current mirror. Introduction, Block diagram, characteristics and equivalent circuits of an ideal op-amp, various types of Operational Amplifiers and their applications, Power supply configurations for OP-AMP applications, inverting and non-inverting amplifier configurations. The Practical op-amp: Introduction, Input offset voltage, offset current, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio, Slew rate and its Effect, PSRR and gain – bandwidth product, frequency limitations and compensations, transient response.

UNIT II

Applications of Operational Amplifier

Amplifiers: Adder, subtractor, integrator, differentiator, current amplifier, difference amplifier, instrumentation amplifier, Converters: Current to voltage and voltage to current converters, Active Filters: First order filters, second order active finite and infinite gain low pass, high pass, band pass and band reject filters, Sine Wave Oscillators: RC phase shift oscillator, Wien bridge oscillator, Quadrature oscillator.

UNIT III

Non-Linear Applications of Operational Amplifier

Comparators: Inverting comparator, non-inverting comparator, zero crossing detector, window detector and level detector, Schmitt Triggers: Inverting Schmitt trigger, non-inverting Schmitt trigger with adjustable threshold levels, Waveform Generators: Square wave and triangular wave generator with duty cycle modulation, Precision Rectifiers: Half and full wave precision

rectifiers, log and antilog amplifiers, Peak detectors, sample and hold circuits, voltage to frequency converter, frequency to voltage converter.

UNIT IV

Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC . Dual Slope ADC, Sigma Delta ADC and Pipeline ADC. DAC and ADC Specifications.

UNIT V

Special Purpose Integrated Circuits

Functional block diagram, working, design and applications of Timer 555 (Monostable&Astable), Functional block diagram, working and applications of VCO 566, PLL 565, multiplier MPY634, waveform generator XR 2206, power amplifier LM380. Voltage Regulators: Functional block diagram, working and design of three terminal fixed (78XX, 79XX series), three terminal adjustable (LM 317, LM 337) voltage regulators and Switching regulators (LT1070).

Text Books:

1. Roy Choudhury and S. B. Jain, “Linear Integrated Circuits”, New Age International Publishers, 4th Edition
2. Sergio Franco, “Design with operational amplifiers and analog integrated circuits”, Tata McGraw Hill, 3rd Edition.
3. Ramakant A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, Pearson Prentice Hall, 4 th Edition

References:

1. Sedra A.S. & Smith K.C., “Microelectronic Circuits’, Oxford University Press 1998
2. William D. Stanley, “Operational Amplifiers with Linear Integrated Circuits ”, Pearson, 4th Edition 3. D.
3. David A. Bell, “Operation Amplifiers and Linear Integrated Circuits”, Oxford University Press, Indian Edition..
4. R. P. Jain, “Modern Digital Electronics,” Tata McGraw Hill, 3rd Edition.

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III B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A50402	Analog Communication Systems	3			3

COURSE OBJECTIVES	
Students undergoing this course, are expected to	
1	Understand Modulation & demodulation techniques of AM, DSB, SSB &VSB
2	Understand Modulation & demodulation techniques of FM
3	Know Noise Figure in AM & FM receiver systems
4	Understand Function of various stages of AM, FM transmitters and Know Characteristics of AM & FM receivers.
5	Understand the concepts of information theory
COURSE OUTCOMES	
CO1	Able to analyze time and frequency domain spectra of signal required under various modulation schemes.
CO2	Understand the concepts of Angle Modulation.
CO3	Analyze the various functional blocks of radio transmitters and receivers.
CO4	Understand the performance of noise in AM and FM schemes in communication system
CO5	Understand the concepts of information theory with random processes.

UNIT – I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Quadrature amplitude modulation (QAM), Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Carrier Acquisition- phased locked loop (PLL), Costas loop, Frequency division multiplexing (FDM), and Super-heterodyne AM receiver, Illustrative Problems.

UNIT – II

Angle Modulation &Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves – Indirect method, Direct generation; Demodulation of FM, Bandpass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM Capture Effect, Illustrative Problems.

UNIT – III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, Filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

UNIT – IV

Analog pulse modulation schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.

Radio Receiver: Superheterodyne Receiver, Sensitivity, Selectivity, and fidelity.

UNIT – V

Information & Channel Capacity: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Markoff sources, Shannon‟s encoding algorithm, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memoryless channels, Discrete channels with memory, Shannon – Hartley theorem and its implications, Illustrative problems.

Text Books:

1. B. P. Lathi, “Modern Digital and Analog Communication Systems,” Oxford Univ. press, 3rd Edition, 2006.
2. Communication Systems by Simon HaykinsJohn Wiley &Sons , 4th Edition.
3. Sham Shanmugam, “Digital and Analog Communication Systems”, Wiley-India edition, 2006.

References:

1. Bruce Carlson, & Paul B. Crilly, “Communication Systems – An Introduction to Signals & Noise in Electrical Communication”, McGraw-Hill International Edition, 5th Edition, 2010.
2. Herbert Taub& Donald L Schilling, “Principles of Communication Systems”, Tata McGraw-Hill, 3rd Edition, 2009.
3. R.E. Ziemer& W.H. Tranter, “Principles of Communication-Systems Modulation & Noise”, Jaico Publishing House, 2001.
4. George Kennedy and Bernard Davis, “Electronics & Communication System”, TMH, 2004.

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III B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A50403	Digital System Design using VHDL	3	-	-	3

COURSE OBJECTIVES	
1	Understand methodologies to know about different design entry methods
2	To be able to model digital circuits in hardware description languages
3	To be able to use VHDL editors, debug designs and perform logic simulation
4	To be able to implement designs on Programmable Logic Devices
COURSE OUTCOMES	
Upon completion of this course, students will be able to:	
CO1	Choose appropriate design technology for a given design
CO2	Work in a team to develop and implement designs
CO3	Choose a right design entry method and model a digital system using a design entry
CO4	Tool debug and test at the logic level and perform logic synthesis

UNIT I
Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements

UNIT II
Subprograms – Functions, Procedures, attributes, generio, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

UNIT III
Design and VHDL implementation of Combinational logic circuit – full adder, Subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits. Introduction to ROM, PLA, PAL,

UNIT IV
Design and VHDL implementation of Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC). Asynchronous sequential circuit design – primitive flow table, concept of race, critical race and hazards, design issues like metastability, synchronizers, and clock skew and timing considerations.

UNIT V
Introduction to Synthesis, Testing of logic circuits, Simple Test benches. Introduction to Hierarchical and Structured Design, Role of CAD Tools in the VLSI design process.

Text Books:
1. Douglas L.Perry "VHDL programming by Example" Tata McGraw Hill J. Bhasker, A VHDL Primer, PH/Pearson
2. J.Bhasker, A VHDL Synthesis Primer, Second Edition, Star Galaxy.

References:
1. Fundamentals of Digital Logic with VHDL design – Stephen Brown, ZvonkoVranesic, TMH.
2. Charles H Roth Jr."Digital System Design using VHDL" Thomson learning,2004
3. Digital System Design – John Wakerley.
4. V Z. Navabi, "VHDL-Modular Design and Synthesis of cores and Systems", TMH – 3rd Edition

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III B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A50404	**Antennas and Wave propagation**	3	-	-	3

COURSE OBJECTIVES	
1	Introduces the concepts of basic antenna terminologies
2	Introduces the various antennas based on their operating frequency & physical arrangement
COURSE OUTCOMES	
Upon completion of the course, students will be able to:	
CO1	analyze the fundamentals of antenna theory and the radiation mechanism.
CO2	understand the applications of the electromagnetic waves in free space and the working principles of various types of antennas.
CO3	understand how to measure antenna parameters like gain, directivity and radiation pattern measurement.
CO4	understand the concepts of radio wave propagation.

UNIT I

Antenna Basics: Introduction, Basic Antenna Parameters - Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivty-Gain-Resolution, Antenna Apertures, Effective Height. Related Problems.

Thin Linear Wire Antennas: Radiation from Small Electric Dipole, Quarterwave Monopole and Halfwave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of Different Lengths, Illustrative Problems. 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).

UNIT II

VHF, UHF AND Microwave Antennas - I: Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles & their characteristics, Helical Antennas - Helical geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas - Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

UNIT III

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 - Introdcution, Flar Sheet and Corner Reflectors, Paraboloidal Reflectors - Geometry, Pattern Characteristics, Feed Methods, Reflector Types - Related Features, Illustrative Problems.

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

UNIT IV

Antenna Arrays: Point Sources - Definition, Pattern, 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 Comparision, BSAs with Non-unitform Amplitude Distributions - General Considerations and Binomial Arrays, Illustrative Problems.

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 Comparision, Absolute and 3-Antenna Methods)

UNIT V

Wave Propagation - I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Quantitative Treatment) - Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections, Space Wave Propagation - Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super retraction, M-Curves and Duct Propagation, Scattering Phenomena, Tropospheric Propagation.

Wave Propagation - II: Sky Wave Propagation - Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation.

Text Books:

1. Antennas for All Applications – John D. Kraus and R. J. Marhefka, and Ahmad S. Khan TMH, New Delhi, 4th ed., (Special Indian Edition) 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, SatyaPrakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill (International Edition), 2nd Ed. 1988.

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III B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A50405	Linear IC Applications Lab	-	1	3	2

COURSE OBJECTIVES	
1	Understand the building blocks and performance parameters of an operational amplifier.
2	Realize analog filters using Op-amp.
3	Design monostable and astable multivibrators using 555 IC.
4	Get knowledge to interface real life analog signals to the digital computational devices through ADCs and DACs.

COURSE OUTCOMES	
CO1	Analyze and design simple differential amplifier circuits with BJTs/FETs for Integrated circuits (IC)
CO2	Analyze and design operational amplifier circuits for linear and non-linear applications.
CO3	Design analog filters and realize them using operational amplifier based simple filter circuits.
CO4	Understand the working of mixed signal circuits like Analog to Digital Convertors, Digital to analog Convertors and Phase Locked Loop
CO5	Understand the working of a few application specific analog ICs and design circuits based on these ICs.

LIST OF EXPERIMENTS

- Interpretation of data sheets (741, TL082, 555, 565)

1. Applications of Op-amp
To study the application of Opamp IC741/TL082 as
a. Inverting amplifier
b. Non-inverting amplifier
c. Voltage follower
d. Summer
e. Subtractor

2. Differentiator and Integrator
To study the op-amp performance as differentiator and integrator for various time constants

3. Comparator circuits
To study zero crossing detector, window detector and Schmitt trigger using opamp 741/TL082

4. Signal converters
To study operation of op-amp as V to I and I to V converters

5. Active filters using Op-amp
To design and test the performance of a 2nd order LPF, HPF, BPF and BSF

6. Log, antilog and instrumentation amplifier
To study 1. logarithmic and antilog amplifiers 2. Instrumentation amplifier

7. Precision rectifiers To study performance of half wave and full wave precision rectifiers using IC 741.

8. Multivibrators using Op-Amp
To design and study the working of a. astable multivibrator b. monostable multivibrator using IC 741/TL082

9. Data converters
Construction and study performance of
a. DAC circuits – R-2R and ladder type.
b. Successive approximation type ADC.

10. Multivibrators using IC 555
To design and study the working of a. astable multivibrator b. monostable multivibrator using IC 555.

11. Frequency synthesizers
To study performance of
a. Frequency multiplier using PLL IC 565
b. Frequency synthesizer using IC XR2240

12. Design and Testing of DC power supply using LM317 and LM723.

Equipment required for Laboratory
Software:
i. Multisim/ Pspice/Equivalent Licensed simulation software tool
ii. Computer Systems with required specifications

Hardware:
1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

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III B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A50406	Analog Communication Systems Lab		1	3	2

COURSE OBJECTIVES	
This course is intended to	
1	Understand all types of analog modulation / demodulation principles such as AM, DSB-SC, FM
2	recognize the importance of pre-emphasis and de-emphasis
3	Substantiate pulse modulation techniques
4	To measure the radio receiver and antenna parameters.

COURSE OUTCOMES	
Upon completion of the course, students will be able to:	
CO1	Design and simulate modulation and demodulation circuits such as AM,DSB-SC,FM.
CO2	Construct pre-emphasis and de-emphasis at the transmitter and receiver respectively
CO3	Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.
CO4	Design and simulate the PAM,PWM&PPM circuits
CO5	Measure characteristics of radio receiver and antenna measurements.

LIST OF EXPERIMENTS

1. Amplitude modulation and demodulation.
2. AM - DSB SC - Modulation & Demodulation
3. Frequency modulation and demodulation.
4. a. Characteristics of Mixer.
   b. Pre-emphasis & de-emphasis.
5. Pulse amplitude modulation & demodulation.
6. Pulse width modulation & demodulation
7. Pulse position modulation & demodulation.
8. Radio receiver measurements – sensitivity selectivity and fidelity.
9. Measurement of half power beam width (HPBW) and gain of a half wave dipoleantenna.
10. Measurement of radiation pattern of a loop antenna in principal planes.

Any three experiments from the following using MATLAB software

1. Amplitude Modulation – Modulation & Demodulation
2. AM - DSB SC -. Modulation & Demodulation
3. Frequency Modulation – Modulation. & Demodulation
4. Pulse Amplitude Modulation – Modulation & Demodulation
5. PWM, PPM - Modulation . & Demodulation

Equipment & Software required:

Software: i.) Computer Systems with latest specifications ii) Connected in LAN (Optional) iii) Operating system (Windows XP) iv) Simulations software (MATLAB)

Equipment:

1. Regulated Power Supply equipments 0 – 30 V
2. CROs 0 – 20 M Hz.
3. Function Generators 0 – 3 M Hz
4. RF Signal Generators 0 – 1000 M Hz
5. Multimeters
6. Required electronic components (active and passive) for the design of experimentsfrom 1 - 7
7. Radio Receiver Demo kits or Trainers.
8. RF power meter frequency range 0 – 1000 MHz
9. Spectrum Analyzer
10. Dipole antennas (2 Nos.) 850 MHz – 1GHz
11. Loop antenna (1 no.) 850 MHz – 1GHz

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III B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A50407	VHDL Programming Lab		1	3	2

COURSE OBJECTIVES	
1	To familiarize with CAD tools
2	To familiarize with design, simulation and synthesis of combinational and sequential circuits using CAD tools

COURSE OUTCOMES	
Students will be able to	
CO1	understand and use CAD tools for simulation and synthesis of digital systems
CO2	design and synthesize different combinational and sequential circuits
CO3	design and implement complex digital systems using CAD tools
CO4	Implement and test simple digital circuits on FPGA
CO5	write and prepare a lab report that details design procedures and experimental results.

LIST OF EXPERIMENTS

Programming (Using VHDL)

1. Write structural and dataflow VHDL models for
   a) 4-bit ripple carry adder.
   b) 4-bit carry look ahead adder
   c) 8-bit comparator

2. Write a VHDL program in structural model for
   a) 16:1 mux realization
   b) 3:8 decoder realization through 2:4 decoder

3. Write a VHDL program in behavioral model for
   a) 16:1 mux b) 3:8 decoder c) 8:3 encoder d) 8 bit parity generator and checker

4. Write a VHDL program in structural and behavioral models for
   a) 8 bit asynchronous up-down counter b) 8 bit synchronous up-down counter

5. Write a VHDL program for 4 bit sequence detector through Mealy and Moore state machines.

6. Write a VHDL program for traffic light controller realization through state machine.

7. Write a VHDL program in behavioral model for 8 bit shift and add multiplier.

8. Write a VHDL program in structural model for 8 bit Universal Shift Register.

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III B.TECH – I SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A50408	Object Oriented Programming Lab			2	1

COURSE OBJECTIVES	
1	At the end of the course students should be familiar with the main features of the C++ language.
2	Be able to write a C++ program to solve a well specified problem.
3	Be able to debug and test C++ programs
4	To make the students understand the features of object oriented principles and familiarize them with virtual functions, templates and exception handling.
5	To make the students to develop applications using C++

COURSE OUTCOMES	
CO1	Students will be able to apply the computer programming techniques to solve practical problems.
CO2	Students will be able to understand the concepts and implementation of constructors and destructors.
CO3	Students will be able to develop applications using object oriented programming language in C++.
CO4	Student can be able to understand and use the basic programming constructs of C++
CO5	Students are able to learn C++ data types, memory allocation/deallocations, functions and pointers.

LIST OF PROGRAMS

1. Simple C++ Programs to Implement Various Control Structures.
   a. If statement
   b. Switch case statement and do while loop
   c. For loop d. While loop
2. Programs to Understand Structure & Unions.
   a. Structure b. union
3. Programs to Understand Pointer Arithmetic.
4. Functions & Recursion.
   a. Recursion b. function
5. Inline Functions.
6. Programs to Understand Different Function Call Mechanism.
   a. Call by reference b. Call by Value
7. Programs to Understand Storage Specifiers.
8. Constructors & Destructors.
9. Use of "this" Pointer Using class
10. Programs to Implement Inheritance and Function Overriding.
    a. Multiple inheritance –Access Specifiers
    b. Hierarchical inheritance – Function Overriding /Virtual Function
11. Programs to Overload Unary & Binary Operators as Member Function & Non Member Function.
    a. Unary operator as member function
    b. Binary operator as non member function
12. Programs to Understand Friend Function & Friend Class.
    a. Friend Function b. Friend class
13. Programs on Class Templates

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III B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A60401	Microprocessors & Microcontrollers	3	-	-	3

COURSE OBJECTIVES	
The students will be able to:	
1	Understand fundamental operating concepts behind microprocessors and microcontrollers.
2	Appreciate the advantages in using RISC microprocessors / microcontrollers in engineering applications.
3	Design microprocessor / microcontroller based solutions to problems.
4	Develop skill in simple program writing for 8086; MSP430 and applications

COURSE OUTCOMES	
At the end of this course the student will be able to,	
CO1	Understands the internal architecture and organization of 8085 & 8086 processors, MSP430 controller.
CO2	Design and implement programs on 8086 microprocessor.
CO3	Understands the interfacing techniques to 8086 and MSP 430 and can develop assembly language programming to design microprocessor/ micro controller based systems.
CO4	Program MSP 430 for designing any basic Embedded System.
CO5	Design and implement some specific real time applications

UNIT I

Introduction-8085 Architecture-Block Diagram, Flag Register, Pin Diagram, Timing and Control Signals, System Timing Diagram, Overview of 8086-Internal Architecture- Register Organization, Memory Segmentation, Flag Register, Pin Configuration. Interrupt structure of 8085 and 8086

UNIT II

Instruction Formats -Addressing Modes-Instruction Set of 8086, Assembler Directives-Macros and Procedures. Programs Involving Logical, Branch Instructions – Sorting and Evaluating Arithmetic Expressions – StringManipulations-Simple ALPs. Brief discussion of peripheral sub systems like 8251, 8253, 8255, 8257 and 8259 (only Pin diagrams and key features of these peripheral sub systems)

UNIT III

Comparison between RISC and CISC architecture, Low power RISC MSP430 – block diagram, features and architecture,Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, MSP430x5x series block diagram, address space, on-chip peripherals (analog and digital), and Register sets. Sample embedded system on MSP430 microcontroller.

UNIT IV

I/O ports pull up/down registers concepts, Interrupts and interrupt programming. Watchdog timer.System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.

Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

Case Study: MSP430 based embedded system application using ADC & PWM demonstrating peripheral intelligence. "Remote Controller of Air Conditioner Using MSP430"

UNIT V

Serial communication basics, Synchronous/Asynchronous interfaces (like UART, USB, SPI, and I2C). UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices. Implementing Embedded Wi-Fi using C3100

Case Study: MSP430 based embedded system application using the interface protocols for communication with external devices: "A Low-Power Battery less Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID"

Text Books:

1. "Microprocessor and Microcontrollers", N. Senthil Kumar, M. Saravanan, S. Jeevanathan,
   Oxford Publishers. 1 st Edition, 2010
2. "The X86 Microprocessors , Architecture, Programming and Inerfacing" , Lyla B. Das, Pearson
   Publications, 2010
3. MSP430 microcontroller basics. John H. Davies, Newnes Publication, I st Edition

References:

1. http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode
2. http://processors.wiki.ti.com/index.php/MSP430_16-Bit_Ultra
   Low_Power_MCU_Training

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III B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A60402	VLSI Design	3	-	-	3

COURSE OBJECTIVES	
1	Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.
2	Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
3	Give exposure to the design rules to be followed to draw the layout of any logic circuit.
4	Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
5	Provide design concepts to design building blocks of data path of any system using gates.
6	Understand basic programmable logic devices and testing of CMOS circuits.
COURSE OUTCOMES	
CO1	Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
CO2	Choose an appropriate inverter depending on specifications required for a circuit
CO3	Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit
CO4	Design different types of logic gates using CMOS inverter and analyze their transfer characteristics
CO5	Provide design concepts required to design building blocks of data path using gates.
CO6	Design simple memories using MOS transistors and can understand design of large memories.
CO7	Design simple logic circuit using PLA, PAL, FPGA and CPLD.
CO8	Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system

UNIT I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit ωo; 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: Subsystem 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, EshraghianDougles 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.
3. VLSI Design – M. Michael Vai, 2001, CRC Press.

References:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
5. Introduction to VLSI – Mead & Convey, BS Publications, 2010.

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III B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A60403	Digital Communication Systems	3	-	-	3

COURSE OBJECTIVES	
1	To introduce the different digital modulation techniques such as PCM
2	To introduce different error detecting and error correcting codes like block codes

COURSE OUTCOMES	
Upon completion of the course, students will be able to:	
CO1	Understand the elements of digital communication system and able to analyse the different coding and modulation techniques.
CO2	Understand the basic principles of baseband and passband digital modulation schemes.
CO3	Analyze probability of error performance of digital systems and are able to design digital communication systems.
CO4	Understand the basics of information theory and error correcting codes.
CO5	Understand the elements of digital communication system and able to analyse the different coding and modulation techniques.

UNIT I

Source Coding Systems: Introduction, sampling process, quantization, quantization noise, conditions for optimality of quantizer, encoding, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM), Differential PCM (DPCM), Processing gain, Adaptive DPCM (ADPCM), Comparison of the above systems.

UNIT II

Baseband Pulse Transmission: Introduction, Matched filter, Properties of Matched filter, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist‟s criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Partial response signaling, Baseband M-array PAM transmission, Eye diagrams.

UNIT III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt orthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signal constellation diagram.

UNIT IV

Passband Data Transmission: Introduction, Passband transmission model, Coherent phase-shift keying – binary phase shift keying (BPSK), Quadrature shift keying (QPSK), Binary Frequency shift keying (BFSK), Error probabilities of BPSK, QPSK, BFSK, Generation and detection of Coherent BPSK, QPSK, & BFSK, Power spectra of above mentioned modulated signals,M-array PSK, M-array quadrature amplitude modulation (M-array QAM), Non-coherent orthogonal modulation schemesDifferential PSK, Binary FSK, Generation and detection of non-coherent BFSK, DPSK, Comparison of power bandwidth requirements for all the above schemes.

UNIT V

Channel Coding: Error Detection & Correction - Repetition & Parity Check Codes, Interleaving, Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Convolutional Codes – Convolutional Encoding, Decoding Methods.

Text Books:

1. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. B.P. Lathi, &Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.

References:

1. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley, 2005.
2. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010
3. Bernard Sklar, "Digital Communications", Prentice-Hall PTR, 2nd edition, 2001.
4. HerbertTaub& Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.
5. J. G. Proakis, M Salehi, Gerhard Bauch, "Modern Communication Systems Using MATLAB," CENGAGE, 3rd Edition, 2013.

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III B.TECH – II SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A60404	Digital Signal Processing	2	2	-	3

	COURSE OBJECTIVES
1	To provide background and fundamental material for the analysis and processing of digital signals.
2	To familiarize the relationships between continuous-time and discrete time signals and systems.
3	To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
4	To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
5	The impetus is to introduce a few real-world signal processing applications.
6	To acquaint with DSP processor.
	COURSE OUTCOMES
CO1	Compute the fast Fourier transforms and find the relationship with other transforms.
CO2	Understand and design FIR and IIR digital filters.
CO3	Study about realization of digital filter structures.
CO4	Understand DSP building blocks to achieve high speed in DSP processor.
CO5	Understand the DSP TMS320C54XX architecture and instructions.

UNIT I

Discrete Fourier Transform: Discrete Fourier series, Properties of Discrete Fourier series, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT.

Fast Fourier Transforms: Efficient computation of DFT algorithms - Radix 2-Decimation-in-Time & Decimation-in-Frequency algorithms, Inverse FFT.

UNIT II

FIR Digital Filters: Linear phase FIR filter, characteristic response, location of zeros, Design of FIR filter - Windowing, Frequency sampling, Illustrative problems.

Realization of FIR systems: Structures for FIR systems - Direct form, Cascade form and Lattice structures.

UNIT III

IIR Digital Filters: Design of IIR filters from Analog filters - Impulse invariance, Bilinear transformation, Comparison of FIR and IIR filters, Frequency transformation in the analog and digital domains, Illustrative problems.

Realization of IIR systems: Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel form and Lattice structures.

UNIT IV

Introduction to DSP Processors: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues.

UNIT V

Programmable Digital Signal Processors: Introduction, Commercial Digital signal-processing Devices, Architecture of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

Text Books:

1. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications," Pearson Education/PHI, 4th ed., 2007.
2. A.V.Oppenheim and R.W. Schaffer, & J R Buck, "Discrete Time Signal Processing," 2nd ed., Pearson Education, 2012.
3. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
4. Digital Signal Processors, Architecture, Programming and Applications – B. VenkataRamani and M.Bhaskar, TMH, 2004.

References:

1. Sanjit K Mitra, "Digital signal processing, A computer base approach," Tata McGraw Hill, 3rd edition, 2009.
2. B. P. Lathi, "Principles of Signal Processing and Linear Systems," Oxford Univ. Press, 2011.

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III B.TECH – II SEMESTER
Open Elective – I

Subject Code	Title of the Subject	L	T	P	C
17A60405	Principles of Electronic Communication Systems	3	-	-	3

COURSE OBJECTIVES	
1	Introduce the students to modulation and various analog and digital modulation schemes.
2	They can have a broad understanding of satellite, optical, cellular, mobile, wireless and telecom concepts.
COURSE OUTCOMES	
CO1	Work on various types of modulations.
CO2	Should be able to use these communication modules in implementation.
CO3	Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

UNIT I

Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

UNIT II

Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

UNIT III

Telecommunication Systems: Telephones Telephone system, Paging systems, Internet Telephony.

Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

UNIT IV

Satellite Communication: Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems.

Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT V

Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.

Wireless Technologies: Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Text Books:

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill publications, 2008.
2. Kennady, Davis, Electronic Communications systems, 4e, TMH, 1999

References:

1. TarmoAnttalainen, Introduction to Telecommunications Network Engineering, Artech House Telecommunications Library.
2. Theodore Rappaport, Wireless Communications-Principles and practice, Printice Hall, 2002.
3. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
4. Wayne Tomasi, Introduction to data communications and networking, Pearson Education, 2005.

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III B.TECH – II SEMESTER
Open Elective – I

Subject Code	Title of the Subject	L	T	P	C
17A60406	**Digital Electronics**	3	-	-	3

COURSE OBJECTIVES	
1	To introduce the methods for simplifying Boolean expressions
2	To outline the formal procedures for the analysis and design of combinational circuitsand sequential circuits
3	To introduce the concept of memories and programmable logic devices.
4	To illustrate the concept of synchronous and asynchronous sequential circuits
COURSE OUTCOMES	
CO1	Analyze different methods used for simplification of Boolean expressions.
CO2	Design and implement Combinational circuits.
CO3	Design and implement synchronous and asynchronous sequential circuits.
CO4	Write simple HDL codes for the circuits

UNIT I

Minimization Techniques And Logic Gates

Minimization Techniques: Boolean postulates and laws – De-Morgan‟s Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions –- Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don‟t care conditions – Quine - McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND–NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates

UNIT II

Combinational Circuits -Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

UNIT III

Sequential Circuits-Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

UNIT IV

Memory Devices

Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET

RAM cell – Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

UNIT V

Synchronous and Asynchronous Sequential Circuits

Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.

Text Books:

1. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003. 37

References:

1. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
2. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
3. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
4. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006.
5. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011
6. Donald D.Givone, "Digital Principles and Design", TMH, 2003.

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III B.TECH – II SEMESTER
Open Elective – I

Subject Code	Title of the Subject	L	T	P	C
17A60407	**Principles of Digital Signal Processing**	3	-	-	3

COURSE OBJECTIVES	
1	This course will provide the student with an intuitive and practical understanding of the fundamental concepts of discrete-time signal processing.
	The intended for all engineering undergraduates who may require a technical understanding of the fundamentals used in digital signal processing
2	The intention is to also provide the student with the necessary background for taking advanced level courses in signal and image processing, and ideally, for reading technical literature in DSP
3	computer simulation exercises are intended to familiarize the student with implementation aspects and the application of theoretical knowledge to practical problems.
COURSE OUTCOMES	
Upon successful completion of this course, students will be able to:	
CO1	characterize discrete time signals and LTI signal processing systems mathematically.
CO2	analyze the functions performed by simple discrete-time systems.
CO3	Develop the discrete Fourier transform (DFT) over time domain signals, its applications and its implementation by FFT techniques.
CO4	apply the design techniques for FIR type digital filters known as the —windowing method.
CO5	design IIR type digital filters over the given specifications

UNIT I Introduction to Signal and Systems

Basic Signals and Systems – properties and basic operations-1-D Signals and Filters - Random Signals - Multi-dimensional Signals – Analog and Digital signals and their conversion techniques Convolution process, Filtering process, Z-transform concepts

UNIT II Time domain analysis and Characteristics

Correlation and Discrete sequences: notation, signal characteristics, and operations Discrete linear time invariant systems -Properties and analysis of discrete linear time invariant systems Periodic sampling: aliasing and low pass filtering

UNIT III Frequency domain Analysis

Discrete Fourier transforms (DFT) DFT properties: symmetry, linearity, magnitudes, frequency axis, and shifting Inverse DFT - Fast Fourier transform (FFT): relationship to DFT, implementation considerations, radix-2 algorithm, and input/output indexing FFT: butterfly algorithm structures

UNIT IV FIR filter design

FIR filters – Introduction-Basic properties-Design using Hamming, Hanning Windows - Realization of FIR filters

UNIT V IIR filter design

Review of design of analogue Butterworth Filters, - Design of IIR digital filters using impulse invariance technique - Realization using direct, cascade and parallel forms.

Text Books:

1. Richard G. Lyons, Understanding Digital Signal Processing, Third edition, Prentice-Hall, 2011.
2.Introduction to Digital Signal Processing, J.Proakis & E. Manolakis, MacMillan, 2007 (4 th Edition)

References:

1. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw Hill International, 2007
2.E.C. Ifeachor and B.W. Jervis, " Digital signal processing - A practicalapproach",Second edition, Pearson, 2002.

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III B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A60408	**Microprocessors & Microcontrollers Lab**		1	3	2

COURSE OBJECTIVES	
The students will be able to:	
1	Write ALP for arithmetic and logical operations in 8086
2	Familiarize with MASM, Embedded C & Code composer studio
3	Write and execute programs in 8086 and MSP430.

COURSE OUTCOMES	
At the end of this course the student will be able to,	
CO1	Execution of different programs for 8086 in Assembly Level Language using MASM Assembler
CO2	Program MSP 430 for various applications.
CO3	Design and implement some specific real time applications

LIST OF EXPERIMENTS

Part A: 8086 Microprocessor Programs using NASM/8086 microprocessor kit.

1. Introduction to MASM Programming.
2. Programs using arithmetic and logical operations
3. Programs using string operations and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison.
4. Programs using CALL and RET instructions

Part B: Embedded C Experiments using MSP430 Microcontroller

1. Interfacing and programming GPIO ports in C using MSP430 (blinking LEDs , push buttons)
2. Usage of Low Power Modes: (Use MSPEXP430FR5969 as hardware platform and demonstrate the low power modes and measure the active mode and standby mode current)
3. Interrupt programming examples through GPIOs
4. PWM generation using Timer on MSP430 GPIO
5. Interfacing potentiometer with MSP430
6. PWM based Speed Control of Motor controlled by potentiometer connected to MSP430 GPIO
7. Using ULP advisor in Code Composer Studio on MSP430
8. Low Power modes and Energy trace++:
   a. Enable Energy Trace and Energy Trace ++ modes in CCS
   b. Compute Total Energy, and Estimated lifetime of an AA battery.

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III B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A60409	Digital Communication Systems Lab	-	1	3	2

COURSE OBJECTIVES	
1	Develops skills for performance analysis of practical digital communication systems.
2	This lab focuses the fundamental concepts on TDM, Pulse modulations, digital modulation techniques.
3	Evaluate the performance of PCM, DPCM and DM in a digital communication system.
4	Learns to use new tools software and hardware effectively and creatively to synthesis digital communication systems.

COURSE OUTCOMES	
CO1	After completion of the course the students will be able to experience real time behavior of different digital modulation schemes and technically visualize spectra of different digital modulation schemes.
CO2	Able to design and implement different modulation and demodulation techniques.
CO3	Able to analyze digital modulation techniques by using MATLAB tools.
CO4	Ability to design efficient and effective digital communication system with the help of modulation techniques.
CO5	

LIST OF EXPERIMENTS

Minimum of Ten experiments to be conducted (Five from each Part-A&B)

HARDWARE EXPERIMENTS (PART – A)

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Differential phase shift keying.
7. QPSK modulation and demodulation.

SOFTWARE EXPERIMENTS (PART-B)

Modeling of Digital Communications using MATLAB

1. Sampling Theorem – verification.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Frequency shift keying.
5. Phase shift keying.
6. Differential phase shift keying.
7. QPSK modulation and demodulation.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CROs - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators (3 Nos.) - 0 – 1000 M Hz.
5. Multimeters
6. Lab Experimental kit for Pulse Code Modulation (Experiment No.3 of part – A)

7. Required Electronic Components (Active and Passive) which include required ICs
8. Arbitrary Wave form generators/ PNS generators – 2 Nos. (to generate digital data at required data rates)
9. Licensed MATLAB software for 30 users with required tool boxes.

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III B.TECH – II SEMESTER

Subject Code	Title of the Lab	L	T	P	C
17A65501	**Advanced English Language Communication Skills Lab**	-	1	3	2

COURSE OBJECTIVES	
1	To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2	Further, they would be required to communicate their ideas relevantly and coherently in writing.
3	To prepare all the students for their placements.
4	To initiate them into greater use of the computer in resume preparation, report writing, format making etc.
5	To train them to use language effectively to face interviews, group discussions, public speaking.

COURSE OUTCOMES	
CO1	Accomplishment of sound vocabulary and its proper use contextually
CO2	Flair in Writing and felicity in written expression.
CO3	Effective Speaking Abilities for enhanced job prospects.
CO4	Able to use technology to enhance job oppurtunities
CO5	Develop language competency and become confident users of English in interviews, Group Discussions, and Public Speaking

UNIT-I: COMMUNICATIVE COMPETENCY

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary for competitive purpose
4. Spotting errors

UNIT-II: TECHNICAL WRITING

1. Report writing
2. Curriculum vitae
3. E-mail writing
4. Abstract & Synopsis Writing
5. Reviewing (Book/Film)

UNIT-III: PRESENTATIONAL SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation
4. Stage dynamics
5. Body Language

UNIT-IV: CORPORATE SKILLS

1. Telephonic skills
2. Net Etiquettes
3. SMART Goal setting

4. Time Management
5. Negotiation Skills

UNIT-V: GETTING READY FOR JOB

1. Group discussions-II
2. Interview skills
3. Answering Strategies
4. Mock Interviews

MINIMUM REQUIREMENT FOR ELCS LAB:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

SUGGESTED SOFTWARE:

10. Walden Infotech English Language Communication Skills.
11. Clarity Pronunciation Power – Part I (Sky Pronunciation)
12. Clarity Pronunciation Power – part II
13. LES(Learn English Select) by British council
14. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
15. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
16. Lingua TOEFL CBT Insider, by Dreamtech
17. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
18. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
2. **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
3. **Train2success.com**

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
3. Books on **TOEFL/GRE/GMAT/CAT/ IELTS** by Barron's/DELTA/Cambridge University Press.2012.
4. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
5. **Practice Psychometric Tests**: How to familiarize yourself with genuine recruitment tests, 2012.
6. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
7. **Handbook for Technical Writing** by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
8. **English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.**
9. **Word Power Made Handy,** Shalini Verma, S Chand Publications, 2011.
10. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011.

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IV B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A75401	**Management Science**	3	-	-	3

COURSE OBJECTIVES	
1	To provide fundamental knowledge on Management, Administration, Organization & its concepts.
2	To understand the role of management in Production
3	To study Materials/Purchases/Stores/Inventory/Marketing Management and Quality control
4	To study HRM in order to have an idea on Recruitment, Selection, Training &Development, job evaluation and Merit rating concepts.
5	To identify Strategic Management areas & to Study the PERT/CPM for better Project Management.

COURSE OUTCOMES	
CO1	1. To apply the concepts & principles of management & designs of organization in a practical world.
CO2	To design good plant layout and apply Work-study principles, Quality Control techniques, in real life industry & To maintain & control the Inventory & students can able to identify the importance of marketing in emerging world.
CO3	To apply the concepts of HRM in Recruitment, Selection, Training & Development.
CO4	To develop PERT/CPM Charts for projects of an enterprise and estimate time & cost of project & to analyse the business through SWOT .
CO5	They can aware of the latest and contemporary issues of management science.

UNIT I: INTRODUCTION TO MANAGEMENT:

Management-Concept and meaning-Nature-Functions-Management as a Science and Art and both. Schools of Management Thought-Taylor's Scientific Theory-Henry Fayol's principles- Eltan Mayo's Human relations-Systems Theory- **Organizational Structure and Design**: Features of Organizational Structure-Work Specialization-Departmentation-Span of Control-Centralization and Decentralization. **Organisational Designs**-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of Organization-Social responsibilities of Management.

UNIT II: OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of Production (Job, batch and Mass Production), Work Study- Statistical Quality Control**:** *C* chart, *P* chart, (simple Problems) Deming's contribution to Quality. **Material Management:** Objectives-Inventory-Functions, Types, Inventory Techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management- Just-In-Time (JIT). **Marketing Management:** Concept- Meaning - Nature- Functions of Marketing-Marketing Mix- Channels of Distribution -Advertisement and Sales Promotion- Marketing Strategies based on Product Life Cycle.

UNIT III: HUMAN RESOURCES MANAGEMENT (HRM):

HRM- Definition and Meaning – Nature-Managerial and Operative functions-Evolution of HRM-Job Analysis -Human Resource Planning(HRP)-Employee Recruitment-Sources of Recruitment-Employee Selection- Process and Tests in Employee Selection- Employee Training and

Development-On- the- job & Off- the- job training methods-Performance Appraisal Concept-Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary Administration-Objectives-Essentials of Wage and Salary Administration-Job Evaluation-Employee Grievances-Techniques of handling Grievances.

UNIT IV: STRATEGIC & PROJECT MANAGEMENT:

Definition& Meaning-Setting of Vision- Mission- Goals- Corporate Planning Process-Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis. **Project Management:**Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying Critical Path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT V: CONTEMPORARY ISSUES IN MANAGEMENT:

The concept of Management Information System(MIS)- Materials Requirement Planning (MRP)-Customer Relations Management(CRM)- Total Quality Management (TQM)- Six Sigma Concept-Supply Chain Management(SCM)- Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

Text Books:

1. A.R Aryasri: Management Science, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.

References:

1. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich ManagementPrinciples and Guidelines,Biztantra.
3. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
4. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
5. Samuel C.Certo: Modern Management, 9/e, PHI, 2005
6. Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2002.
7. Parnell: Strategic Management, Biztantra, 2003.
8. Lawrence R Jauch, R.Gupta &William F.Glueck: Business Policy and Strategic Management, Frank Bros., 2005.

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IV B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A70401	**Electronic Measurements & Instrumentation**	3			3

	COURSE OBJECTIVES
1	To provide an understanding of various measuring systems functioning and metrics for performance analysis.
2	Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3	Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.
	COURSE OUTCOMES
CO1	Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO2	Measure various physical parameters by appropriately selecting the transducers.
CO3	Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.

UNIT I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters –multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

UNIT II

Oscilloscopes: Standard specifications of CRO,CRT features, derivation of deflection sensitivity, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, triggered sweep CRO, and Delayed sweep, dual trace/beam CRO, Measurement of amplitude, frequency and phase (Lissajous method).Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

UNIT III

Signal generators-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, specifications and principles of working (Block diagram approach).Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.

UNIT IV

Review of DC Bridges: Wheatstone bridge, Wein Bridge, errors and precautions in using bridges, AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- SchearingBridge.Kelvin Bridge, Q-meter, EMI and EMC, Interference and noise reduction techniques.

UNIT V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Text Books:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 5th Edition, 2002.
2. H.S.Kalsi, "Electronic instrumentation", second edition, Tata McGraw Hill, 2004.
3. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.

References:

1. H.S.Kalsi, "Electronic instrumentation", second edition, Tata McGraw Hill, 2004.
2. Ernest O Doebelin and Dhanesh N Manik, "Measurement Systems Application and Design", TMH, 5th Edition, 2009.
3. Oliver and Cage, "Electronic Measurement and Instrumentation", TMH.
4. Robert A.Witte, "Electronic Test Instruments, Analog and Digital Measurements", Pearson Education, 2nd Ed., 2004.
5. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2003.

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IV B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A70402	**Optical Communications**	3	-	-	3

COURSE OBJECTIVES	
1	To realize the significance of optical fibre communications.
2	To understand the construction and characteristics of optical fibre cable.
3	To develop the knowledge of optical signal sources and power launching.
4	To identify and understand the operation of various optical detectors.
5	To understand the design of optical systems and WDM.
COURSE OUTCOMES	
At the end of the course, the student will be able to:	
CO1	Understand and analyze the constructional parameters of optical fibres.
CO2	Be able to design an optical system.
CO3	Estimate the losses due to attenuation, absorption, scattering and bending.
CO4	Compare various optical detectors and choose suitable one for different applications.

UNIT I

Introduction to Optical Fibers: Evolution of fiber optic system- Element of an Optical FiberTransmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes – Single Mode Fibers-Graded Index fiber structure.

UNIT II

Signal Degradation Optical Fibers: Attenuation–Absorption losses, Scattering losses, BendingLosses, Core and Cladding losses, Signal Distortion in Optical Wave guides - Information Capacity determination –Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT III

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures– Lightsource materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies – Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensing schemes, Fiber –to- Fiber joints, Fiber splicing.

UNIT IV

Fiber Optical Receivers : PIN and APD diodes–Photo detector noise, SNR, Detector Response time,Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit.

UNIT V

System Design and Applications: Design of Analog Systems: system specification, power budget,bandwidth budget

Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity.

Text Books:

1. Gerd Keiser, "Optical Fiber Communication" McGraw –Hill International, Singapore, 3rd ed., 2000.
2. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.

References:

1. Max Ming-Kang Liu, "Principles and Applications of Optical Communications", TMH, 2010.
2. S.C.Gupta, "Text book on optical fiber communication and its applications", PHI, 2005.
3. Satish Kumar, "Fundamentals of Optical Fiber communications", PHI, 2009.

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IV B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A70403	Microwave Engineering	3	-	-	3

COURSE OBJECTIVES	
1	To get familiarized with microwave frequency bands
2	To develop the theory related to microwave transmission lines
3	To distinguish between different types of microwave tubes
4	To impart the knowledge of Scattering Matrix
5	To understand the concepts of microwave measurements
COURSE OUTCOMES	
CO1	To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical microwave transmission line problems.
CO2	To distinguish between the different types of waveguide and ferrite components, explain their functioning and select proper components for engineering applications.
CO3	To distinguish between the methods of power generation at microwave frequencies, derive the performance characteristics of 2-Cavity and Reflex Klystrons, Magnetrons, TWTs and estimate their efficiency levels, and solve related numerical problems
CO4	To realize the need for solid state microwave sources and understand the utility of S-parameters in microwave component design.
CO5	To set up a microwave bench, establish the measurement procedure and conduct the experiments in microwave lab for measurement of various microwave parameters.

UNIT I

Waveguides: 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, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics — Phase and Group Velocities, Wavelengths and Impedance Relations, Illustrative Problems.

Rectangular Guides: Power Transmission and Power Losses, Impossibility of TEM Mode, Micro strip Lines— Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor.

UNIT II

Cavity Resonators— Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q Factor and Coupling Coefficients, Illustrative Problems

Waveguide Components and Applications: 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 Ferrites— Composition and Characteristics, Faraday Rotation, Ferrite Components — Gyrator, Isolator, Circulator.

UNIT III

Microwave Tubes: Limitations and Losses of conventional Tubes at Microwave Frequencies, Microwave Tubes — 0 Type and M Type Classifications, 0-type Tubes : 2 Cavity Klystrons — Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory — Expressions for 0/P Power and Efficiency. Reflex Klystrons — Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and 0/P Characteristics, Effect of Repeller Voltage on Power 0/P, Illustrative Problems.

Helix TTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

UNIT IV

M-Type Tubes: Introduction, Cross-field Effects, Magnetrons — Different Types, Cylindrical Traveling Wave Magnetron — Hull Cut—off and Hartree Conditions, Modes of Resonance and P1-Mode Operation, Separation of P1-Mode, 0/p characteristics, Illustrative Problems

Microwave Solid State Devices: 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.

UNIT V

Microwave Measurements: Scattering Matrix— Significance, Formulation and Properties, S Matrix Calculations for — 2 port Junctions, E plane and H plane Tees, Magic Tee, Circulator and Isolator, Illustrative Problems. 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 V. 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.

References:

1. Foundations for Microwave Engineering — R.E. Collin, IEEE Press, John Wiley, 2ndEdition, 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.
4. Electronic and Radio Engineering F.E. Terman, McGraw-Hill, 4th Ed., 1955.
5. Microwave Engineering —A. Das and S.K. Das, TMH, 2nd Ed., 2009,

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IV B.TECH – I SEMESTER
Elective – I

Subject Code	Title of the Subject	L	T	P	C
17A70404	**Data Communications & Networking**	3	-	-	3

COURSE OBJECTIVES	
1	To explain the basic concept of computer communication networks
2	To demonstrate the TCP/IP and OSI models with merits and demerits.
3	To explore the various layers of OSI Model.
4	To introduce IP addressing, UDP and TCP Models.
5	To have the concept of different routing techniques for data communications.
COURSE OUTCOMES	
CO1	Understand the requirement of theoretical & practical aspect of computer network
CO2	Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security.
CO3	To explain the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.

UNIT I

Introduction to Computer Networks: Uses of computer Network, Network Software-design Issues for layers, Service primitives and relationship of services to Protocols, Reference models-OSI &TCP/IP, network architectures introduction, Example of networks-X.25, Frame Relay & ATM, Protocols and Standards.

UNIT II

Physical Layer: Physical layer-Data rate limits, Transmission media-guided and Unguided, Switching systemsCircuit switching, Datagram Switching & Virtual circuit switching, Structure of circuit and packet switch, cable modem and DSL technologies, SONET basics, selection of IEEE std 802.11 ,a,b,c,g.

UNIT III

Data link layer: Framing, Flow & Error control Protocols, HDLC, PPP, Multiple access techniquesrandom access, controlled access & Channelization, Ethernet types-bridged, Switched, Full duplex, Fast & gigabit Ethernet, Introduction to Data link layer in 802.11 LAN, Connecting devices like passive hubs, repeaters, Active hubs, Bridges, Two-layer Switches, Routers, three layer switches, Gateway etc., Backbone networks, Virtual LANs, Simple Router architecture, Sliding window protocol.

UNIT IV

Network Layer: IPv4 address, IPv6 address, Address mapping-ARP, RARP & DHCP, IPv4 datagram detail format, IPv6 datagram detail format, ICMP, IGMP, Network layer issues like Delivery, forwarding, intra-domain and Inter-domain routing, Routing algorithms like Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Path vector routing etc., Addressing types-Physical, Logical & port address.

Transport Layer: Transport layer-Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service.

UNIT V

Application Layer: Application layer protocols and applications like Ping, FTP, telnet, http (www), SMTP, SNMP, Trace route, TFTP, BOOTP, DNS, NFS, RPC, X-server, E-mail, Introduction to streaming Audio/Video,P2P file sharing, Introduction to socket programming.

Text Books:

1. Behrouz A. Forouzan," Data Communications and Networking", 4th Edition, Tata McGraw Hill
2. Andrew Tenenbaum, "Computer Networks", 4th Edition, Pearson Education.
3. Kurose & Ross, "Computer Networking- A top Down Approach featuring the Internet", 3rd edition, Pearson Education.
4. William Stallings, "computer Networks and Cryptography", 3rd edition, Pearson Education

References:

1. Behrouz A. Forouzan, "TCP/IP protocol Suit", 3rd edition, Tata McGraw Hill Publications
2. Stevens,"TCP/IP illustrated Volume - I & II", Pearson education.
3. Feibel Werner, "Encyclopaedia of networking", Pearson education.
4. Frank J. Derfler, "Practical Networking", 2nd edition, QUE international Publishing.

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IV B.TECH – I SEMESTER
Elective – I

Subject Code	Title of the Subject	L	T	P	C
17A70405	**Television Engineering**	3	-	-	3

COURSE OBJECTIVES	
1	Study the different camera and picture tubes.
2	Know about various standard TV channels.
3	Study about TV receiver, sync separation, detector etc.
4	Study about TV receiver, sync separation, detector etc.
COURSE OUTCOMES	
CO1	Expected to understand the concept of TV transmission and reception
CO2	Acquired knowledge about complete TV receiver.
CO3	Expected to learn about color separation, color coding etc.

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.

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.

UNIT V
Color Receiver:
Introduction to colour receiver, Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Color, Phasors, synchronous demodulators, Sub carrier generation, raster circuits.
Digital TV:
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. Modern Television Practice – Principles, Technology and Service- R.R.Gallatin, New Age International Publication, 2002.
3. Monochrome and Colour TV- R.R. Gulati, New Age International Publication, 2002.

References:
1. Colour Television Theory and Practice-S.P.Bali, TMH, 1994.
2. Basic Television and Video Systems-B.Grob and C.E.Herndon, McGraw Hill, 1999.

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IV B.TECH – I SEMESTER
Elective - I

Subject Code	Title of the Subject	L	T	P	C
17A70406	**Radar Engineering**	3	-	-	3

COURSE OBJECTIVES	
1	Radar fundamentals and analysis of radar signals.
2	To understand various technologies involved in the design of radar transmitters and receivers.
3	To learn various like MTI, Doppler and tracking radar and their comparison.
COURSE OUTCOMES	
CO1	Understand radar fundamentals and analysis of the radar signals.
CO2	Understand various radar transmitters and receivers.
CO3	Understand various radar like MTI, Doppler and tracking radar and their comparison.

UNIT I

BASICS 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, Illustrative Problems.

RADAR 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 FREQUENCY MODULATED RADAR: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

UNIT III

MTI AND PULSE DOPPLER RADAR: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, And Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance,MTI versus Pulse Doppler radar.

UNIT IV

TRACKING 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 V

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.

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, Series versus Parallel Feeds, Applications, Advantages and Limitations.

Text Books:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Edition, 2007.

References:

1. Introduction to Radar Systems – Merrill I. Skolnik, 3rd Edition, Tata McGraw-Hill, 2001.
2. Radar Principals, Technology, Applications – Byron Edde, Pearson Education, 2004.
3. Radar Principles – Peebles, Jr., P.Z.Wiley, NweYork, 1998.

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IV B.TECH – I SEMESTER
Open Elective – II

Subject Code	Title of the Subject	L	T	P	C
17A70407	**Electronic Measuring Instruments**	3	-	-	3

COURSE OBJECTIVES	
1	It provides an understanding of various measuring systems functioning and metrics for performance analysis.
2	Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3	Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.
COURSE OUTCOMES	
CO1	Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO2	Measure various physical parameters by appropriately selecting the transducers.
CO3	Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.

UNIT I

Block Schematics of Measuring Systems and Performance Metrics: Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag.

UNIT II

Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, and Specifications

UNIT III

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. CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes.

UNIT IV

Recorders: X-Y Plotter, Curve tracer, Galvanometric Recorders, Servo transducers, pen driving mechanisms, Magnetic Recording, Magnetic recording techniques.

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.

Text Books:

1. Electronic Measurements and Instrumentation: B.M. Oliver, J.M. Cage TMH Reprint 2009.
2. Electronic Instrumentation: H.S.Kalsi – TMH, 2nd Edition 2004.

References:

1. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI 5th Edition 2003.
3. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.
4. Industrial Instrumentation: T.R. Padmanabham Springer 2009.

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IV B.TECH – I SEMESTER
Open Elective – II

Subject Code	Title of the Subject	L	T	P	C
17A70408	**Fuzzy Logic & Neural Networks**	3	-	-	3

COURSE OBJECTIVES	
1	To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals
2	To make the students well acquainted with Soft computing techniques, especially Fuzzy logic and neural networks.
3	To make the students able to identify the complex problems in conventional structures, obtain intelligent acceptable solutions for these problems using soft computing techniques and take the necessary corrective action in the light of ongoing events
COURSE OUTCOMES	
By the end of the course ,the students shall be able to	
CO1	Understand the adequate knowledge about neural networks, program the related algorithms and design the required and related systems.
CO2	Understand the fuzzy set theory .
CO3	study and understand defuzzification techniques.
CO3	provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic

UNIT I

INTRODUCTION: Fundamentals and Models of Artificial Neural Systems, Neural computation: Examples and applications, Biological neurons and their artificial models, Models of artificial networks, Neural processing, Learning and adaptation, Neural network learning rules, Overview of neural networks, Single Layer Perception , multilayer perception & its limitation.

UNIT II

MULTILAYER FEED FORWARD NETWORKS:

Linearly non separable pattern classification, Delta learning rule for multi-perceptron layer, generalized delta learning rule, feed forward recall and error back propagation training, learning factors.

UNIT III

SINGLE LAYER FEEDBACK NETWORKS: Basic concepts and dynamical systems, Mathematical foundations of discrete-time and gradient-type Hopfield networks Application of Neural Networks: control system application like washing machine, refrigerator, signal processing application like ECG, EMG, EEG.

UNIT IV

INTRODUCTION TO FUZZY LOGIC:

Uncertainty and imprecision, Classical sets and Fuzzy sets, Classical relation and fuzzy relations, Operations on crisp and fuzzy relations. Fuzzy tolerance and equivalence

UNIT V

FUZZYFICATION AND DEFUZZIFICATION: Membership functions, Membership assignment, lambda cuts, Defuzzification methods, Fuzzy Arithmetic: Fuzzy numbers, vectors, extension principle, crisp functions, mapping, fuzzy transforms, interval analysis, fuzzy logic controller design.

Text Books:

1. J. M. Zurada, Introduction to Artificial Neural Networks, Jaico Publishing house.
2. T. M. Ross, Fuzzy logic, Mc-Graw Hill Inc. 3. Kosoko, Neural Networks and Fuzzy Systems, PHI Publications

References:

1. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Ed.
2. Fuzzy Logic with Engineering Applications, Timothy J. Ross, 2nd edition, McGraw Hill.
3. Fuzzy Sets & Fuzzy Logic- Theory & Applications, George J. Klir, Bo Yuan , Prentice Hall Publications
4. Neural Network, Fuzzy Logic & Genetic Algorithm, S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI Publications.

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IV B.TECH – I SEMESTER
Open Elective – II

Subject Code	Title of the Subject	L	T	P	C
17A70409	**Microcontrollers and Applications**	3	-	-	3

COURSE OBJECTIVES	
1	To introduce the architecture, programming and interfacing of 8051 Micro controller
2	To introduce microcontroller to different real time applications
	To introduce different peripherals and their interfacing concepts with microcontroller
3	To introduce ARM 32 bit Microcontrollers
4	Students will be are able to positively and appropriately apply knowledge in doing open ended project
COURSE OUTCOMES	
CO1	Ability to apply knowledge of mathematics, engineering to understand concepts in microcontroller based systems
CO2	Ability to analyze a problem and formulate appropriate computing solution for microcontroller based applications
CO3	An ability to design experiments in microcontrollers and analyze computer based process to meet desired needs
CO4	Ability to understand ARM 32 bit Microcontrollers & development tools.

UNIT I - OVERVIEW OF ARCHITECTURE AND MICROCONTROLLER RESOURCES
Architecture of a microcontroller –Microcontroller resources –Resources in advanced and next generation microcontrollers –8051 microcontroller –Internal and External memories –Counters and Timers –Synchronous serial-cum asynchronous serial communication - Interrupts.

UNIT II - INSTRUCTION SET OF 8051 FAMILY MICROCONTROLLERS
Basic assembly language programming –Data transfer instructions –Data and Bit-manipulation instructions –Arithmetic instructions –Instructions for Logical operations among the Registers, Internal RAM, and SFRs –Program flow control instructions –Interrupt control flow.

UNIT III - REAL TIME CONTROL
Interrupts: Interrupt handling structure of an MCU –Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts –Non-Maskable interrupt sources –Enabling or disabling of the sources –Polling to determine the interrupt source and assignment of the priorities among them –Interrupt structure in Intel 8051. Timers: Programmable Timers in the MCUs –Free running counter and real time control –Interrupt interval and density constraints.

UNIT IV - 8051 PROGRAMMING AND APPLICATIONS
Interfacing Serial I/O (8251)- parallel I/O (8255) -Keyboard and Display controller (8279) - ADC/DAC interfacing - Inter Integrated Circuits interfacing (I2C Standard)- LCD-LED and Array of LEDs-Interfacing with the Flash Memory- Prototype MCU based Measuring instruments – Robotics and Embedded control Bus: RS232C-RS485-GPIB8051

UNIT V - REAL TIME OPERATING SYSTEM FOR MICROCONTROLLERS
Real Time operating system –RTOS of Keil (RTX51) –Use of RTOS in Design –Software development tools for Microcontrollers. ARM 32 Bit MCUs: Introduction to 16/32 Bit processors –ARM architecture and organization –ARM / Thumb programming model –ARM / Thumb instruction set –Development tools.

Text Books:

1. Raj Kamal, "Microcontrollers Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.
2. Mohammed Ali Mazidi and Janice Gillispie Mazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education Asia, New Delhi, 2003.

References:

1. Deshmuk.A.V, "Microcontrollers (Theory & Applications)", TMH, 2005.
2. John B. Peatman, "Design with PIC Microcontrollers", Pearson Education, 2005.
3. Kenneth J Ayala, "The 8051 Microcontroller Architecture Programming and Application", 2 nd Edition, Penram International Publishers (India), New Delhi, 1996.
4. Rafi Quazzaman.M, "Microprocessors Theory and Applications: Intel and Motorola", Prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

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IV B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A70410	**Digital Signal Processing Lab**	-	1	3	2

COURSE OBJECTIVES	
1	Students can learn the basics of using DSP chips to perform real-time digital signal processing.
2	Ability to apply knowledge of mathematics, science and engineering: Construction of tools for visualizing the basic concepts of discrete signal representation such as Fourier transforms, discrete time representations.
3	Students will learn numerous programming tools for design and implementations of filtering algorithms.
4	Understand the concept of Multi-rate signal processing and sample rate conversion.
5	Develop and Implement DSP algorithms in software using CCS with DSP floating point Processor.
COURSE OUTCOMES	
CO1	Ability to design-test, to verify, to evaluate, and to benchmark a real-time DSP system.
CO2	Ability to calculate discrete time domain and frequency domain of signals using discrete Fourier Series and Fourier transform.
CO3	Ability to design, using Matlab-based filter design techniques, FIR and IIR digital filters and Determine the frequency response of filters.
CO4	Implementation of basic signal processing algorithms such as convolution, difference equation implementation and application of them in the construction of FIR and IIR filters.
CO5	Design DSP based real time processing systems to meet desired needs of the society.

LIST OF EXPERIMENTS

The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors).

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
2. Histogram of White Gaussian Noise and Uniformly Distributed Noise.
3. To find DFT / IDFT of given DT Signal
4. To find Frequency Response of a given System given in Transfer Function/ Differential equation form.
5. Obtain Fourier series coefficients by formula and using FET and compare for half sine wave.
6. Implementation of FFT of given Sequence
7. Determination of Power Spectrum of a given Signal(s).
8. Implementation of LP FIR Filter for a given Sequence/Signal.
9. Implementation of HP IIR Filter for a given Sequence/Signal
10. Generation of Narrow Band 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. Impulse Response of First order and Second Order Systems.

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

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IV B.TECH – I SEMESTER

Subject Code	Title of the Subject	L	T	P	C
17A70411	**Microwave & Optical Communications Lab**	-	1	3	2

COURSE OBJECTIVES	
1	Understand the working principle of optical sources, detector, fibers and microwave components
2	Develop understanding of simple optical communication link.
3	Learn about the characteristics and measurements in optical fiber
4	Know about the behavior of microwave components.
5	Practice microwave measurement procedures
COURSE OUTCOMES	
CO1	Analyze the performance of simple optical link.
CO2	Test microwave and optical components.
CO3	Analyse the mode characteristics of fiber.
CO4	Analyse the radiation of pattern of antenna.

LIST OF EXPERIMENTS

Microwave Lab (PART – A) --- Any Seven (7) Experiments

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength measurements using slotted section.
8. Impedance Matching and Tuning
9. Scattering parameters of Magic Tee.
10. Radiation Pattern Measurement of horn Antennas (at least two antennas).

Optical Fiber Lab (PART – B) --- Any five (5) Experiments

1. DC Characteristics of LED and PIN Photo diode
2. Mode Characteristics of Fibers
3. Measurement of connector and bending losses
4. Fiber optic Analog and Digital Link- frequency response (analog) and eye diagram (digital)
5. Numerical Aperture determination for Fibers
6. Attenuation Measurement in Fibers

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IV B.TECH – II SEMESTER
Elective - II

Subject Code	Title of the Subject	L	T	P	C
17A80401	**Embedded Systems**	3	-	-	3

COURSE OBJECTIVES	
1	To provide an overview of design principles of Embedded System.
2	To provide clear understanding about the role of firmware , operating systems in correlation with hardware systems.
COURSE OUTCOMES	
CO1	Expected to understand the selection procedure of Processors in the Embedded domain.
CO2	Design Procedure for Embedded Firmware.
CO3	Expected to visualize the role of Real time Operating Systems in Embedded Systems.
CO4	Expected to evaluate the Correlation between task synchronization and latency issues

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, McGraw Hill
2. Embedded Systems - Raj Kamal, TMH.
3. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.

References:

1 Embedded Systems – Lyla, Pearson, 2013
2. Embedded System design : S. Heath (Elsevier)
3. An Embedded Software Primer - David E. Simon, Pearson Education.
4. Embedded microcontroller and processor design: G. Osborn (Pearson)

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IV B.TECH –I SEMESTER
Elective - II

Subject Code	Title of the Subject	L	T	P	C
17A80402	**Coding Theory and Techniques**	3	-	-	3

COURSE OBJECTIVES	
1	To acquire the knowledge in measurement of information and errors.
2	To study the generation of various code methods
3	To study the various application of codes.
COURSE OUTCOMES	
CO1	Learning the measurement of information and errors.
CO2	Obtain knowledge in designing various codes like block codes, cyclic codes, convolution codes, turbo codes and space codes

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,19
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.

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IV B.TECH – I SEMESTER
Elective - II

Subject Code	Title of the Subject	L	T	P	C
17A80403	**Satellite Communications**	3	-	-	3

COURSE OBJECTIVES	
1	Excel in basic knowledge of satellite communication principles
2	solid foundation in orbital mechanics and launches for the satellite communication
3	basic knowledge of link design of satellite with a design examples.
4	better understanding of multiple access systems and earth station technology
5	knowledge in satellite navigation and GPS & and satellite packet communications.
COURSE OUTCOMES	
CO1	Understand the historical background orbital mechanics, launch vehicles and functional principles of satellite communication systems.
CO2	Analyze and evaluate a satellite link and suggest enhancements to improve the link performance.
CO3	Able to study the design of Earth station and tracking of the satellites.

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, Orbit determination, Launches and Launch vehicles, Orbital Effects in Communication Systems Performance.

UNIT II

Satellite Subsystems: Attitude and Orbit Control System, Telemetry, Tracking, Command And Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

UNIT III

Satellite Link Design: Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design of Down Links, Up Link Design, Design Of Satellite Links For Specified C/N, System Design Examples.

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

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 & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs.

Satellite Navigation & 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.

References:

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 4th Edition, 2009.

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IV B.TECH – I SEMESTER
Elective - II

Subject Code	Title of the Subject	L	T	P	C
17A80404	**Digital Image Processing**	3	-	-	3

COURSE OBJECTIVES	
1	To comprehend the relation between human visual system and machine perception and processing of digital images.
2	To provide a detailed approach towards image processing applications like enhancement, segmentation and compression.
COURSE OUTCOMES	
CO1	Exploration of the limitations of the computational methods on digital images.
CO2	Expected to implement the spatial and frequency domain image transforms on enhancement and restoration of images.
CO3	Elaborate understanding on image enhancement techniques.
CO4	Expected to define the need for compression and evaluate the basic compression algorithms.

UNIT I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels.

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood creterion, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain

UNIT III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT IV

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

UNIT V

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

Text Books:

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Fundamentals of Digital Image Processing – A.K.Jain , PHI, 1989

References:

1. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.
2. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - ScotteUmbaugh, 2nd Ed, CRC Press, 2011
3. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
4. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning

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IV B.TECH – II SEMESTER
Elective - V

Subject Code	Title of the Subject	L	T	P	C
17A80405	**Scripting Languages**	3			3

COURSE OBJECTIVES	
The goal of the course is to study	
1	The principles of scripting languages.
2	Motivation for and applications of scripting
3	Difference between scripting languages and non- scripting languages.
4	Types of scripting languages such as PERL, TCL/TK, python and BASH.
5	Creation of programs in the Linux environment and usage of scripting languages in IC design flow.
COURSE OUTCOMES	
Upon learning the course, the student will have the:	
CO1	Ability to create and run scripts using PERL/TCl/Python in IC design flow.
CO2	Ability to use Linux environment and write programs for automation of scripts in VLSI tool design flow.

UNIT I Linux Basics
Introduction to Linux , File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts.

UNIT II Linux Networking
Introduction to Networking in Linux, Network basics & Tools, File Transfer Protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.

UNIT III Perl Scripting.
Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting, References & Subroutines, Running and Debugging Perl, Modules, Object – Oriented Perl.

UNIT IV Tcl / Tk Scripting
Tcl Fundamentals, String and Pattern Matching, Tcl Data Structures, Control Flow Commands, Procedures and Scope, Evel, Working with Unix, Reflection and Debugging, Script Libraries, Tk Fundamentals, Tk by examples, The Pack Geometry Manager, Binding Commands to X Events, Buttons and Menus, Simple Tk Widgets, Entry and List box Widgets Focus, Grabs and Dialogs.

UNIT V Python Scripting.
Introduction to Python, using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.

Text Books:
1. Python Tutorial by Guido Van Rossum, Fred L. Drake Jr. editor , Release 2.6.4
2. Practical Programming in Tcl and Tk by Brent Welch, Updated for Tcl 7.4 and Tk 4.0.
3. Teach Yorself Perl in 21 days by David Till.
4. Red Hat Enterprise Linux 4 : System Administration Guide Copyright, 2005 Red Hat Inc.

References:

1. Learning Python – 2nd Ed., Mark Lutz and David Ascher, 2003, O'Reilly.
2. Perl in 24 Hours – 3rd Ed., Clinton Pierce, 2005, Sams Publishing.
3. Learning Perl – 4th Ed. Randal Schwartz, Tom Phoenix and Brain d foy. 2005.
4. Jython Essentials – Samuele Pedroni and Noel Pappin.2002. O'Reilly.
5. Programming Perl – Larry Wall, Tom Christiansen and John Orwant, 3rd Edition, O'Reilly, 2000. (ISBN 0596000278)

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IV B.TECH – II SEMESTER
Elective - IV

Subject Code	Title of the Subject	L	T	P	C
17A80406	**RF Circuit Design**	3	-	-	3

COURSE OBJECTIVES	
The course objectives are:	
1	To educate students fundamental RF circuit and system design skills.
2	To introduce students the basic transmission line theory, single and multiport networks, RF component modeling
3	To offer students experience on designing matching and biasing networks & RF transistor amplifier design.
COURSE OUTCOMES	
Upon completion of the course, the students will be able to:	
CO1	Explore fundamental RF circuit and system design skills.
CO2	Understand the basic transmission line theory, single and multiport networks, RF component modeling.
CO3	Design matching and biasing networks & RF transistor amplifiers.

UNIT I: Introduction:
Importance of RF Design-Dimensions and Units-Frequency Spectrum-RF Behaviour of Passive Components: High Frequency Resistors, High Frequency Capacitors, High Frequency Inductors.-Chip Components and Circuit Board Considerations: Chip Resistors, Chip Capacitors, and Surface Mount Inductors.

Review of Transmission Lines:
Types of Transmission Lines-Equivalent Circuit representation-R, L, C, G parameters of Different Line configurations-Terminated Lossless Transmission Lines-Special Terminations: Short Circuit, Open Circuit and Quarter Wave Transmission Lines- Sourced and Loaded Transmission Lines: Power Considerations, Input Impedance Matching, Return Loss and Insertion Loss.

UNIT II: Single and Multi-Port Networks:
The Smith Chart: Reflection Coefficient, Normalized Impedance-Impedance Transformation: Standing wave Ratio, Special Transformation Conditions-Admittance Transformation-Parallel and Series RL & RC Connections-Basic Definitions of Single and Multi-Port Networks-Interconnecting Networks.

RF Filter Design:
Scattering Parameters: Definition, Meaning, Chain Scattering Matrix, Conversion Between S- and Z-parameters, Signal Flow Chart Modeling, Generalization-Basic Resonator and Filter Configurations: Low Pass, High Pass, Band Pass and Band Stop type Filters-Filter Implementation using Unit Element and Kuroda's Identities Transformations-Coupled Filters.

UNIT III: Active RF Component Modelling:
RF Diode Models: Nonlinear and Linear Models-Transistor Models: Large Signal and Small Signal BJT Models, Large Signal and Small Signal FET Models- Scattering Parameter, Device Characterization.

UNIT IV: Matching and Biasing Networks:
Impedance Matching Using Discrete Components: Two Component Matching Networks, Forbidden Regions, Frequency Response and Quality Factor, T and Pi Matching Networks-

Amplifier Classes of Operation and Biasing Networks: Classes of Operation and Efficiency of Amplifiers, Biasing Networks for BJT, Biasing Networks for FET.

UNIT V: RF Transistor Amplifier Design:

Characteristics of Amplifiers- Amplifier Power Relations: RF Source, Transducer Power Gain, Additional Power Relations-Stability Considerations: Stability Circles, Unconditional Stability, And Stabilization Methods-Unilateral and Bilateral Design for Constant Gain- Noise Figure Circles- Constant VSWR Circles.

RF Oscillators and Mixers:

Basic Oscillator Model: Negative Resistance Oscillator, Feedback Oscillator Design, Design steps, Quartz Oscillators- Fixed Frequency High Frequency Oscillator -Basic Characteristics of Mixers: Concepts, Frequency Domain Considerations, Single Ended Mixer Design, Single and Double Balanced Mixers.

Text Books:

1. RF Circuit Design – Theory and Applications by Reinhold Ludwig, Pavel Bsetchko – Pearson Education India, 2000.
2. Radio Frequency and Microwave Communication Circuits – Analysis and Design by Devendra K.Misra – Wiley Student Edition – John Wiley & Sons, Inc.

References:

1. Radio Frequency and Microwave Electronics – Illustrated by Matthew M. Radmanesh – PEI.
2. RF Circuit Design – Christopher Bowick, Cheryl Aljuni and John Biyler, Elsevier Science, 2008.
3. Secrets of RF Circuit Design by Joseph J.Carr, TMH, 2000.
4. Design of RF and Microwave Amplifiersand Oscillators, Peter L.D. Abrif, Artech House, 2000.
5. The Design of CMOS Radio Frequency Integrated Circuits by Thomas H.Lee , 2/e – Cambridge University Press, 2004.

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IV B.TECH – II SEMESTER
Elective – III

Subject Code	Title of the Subject	L	T	P	C
17A80407	**Artificial Intelligence**	3	-	-	3

COURSE OBJECTIVES	
1	To introduce the fundamental concepts of artificial intelligence
2	To equip students with the knowledge and skills in logic programming using Prolog
3	To explore the different paradigms in knowledge representation and reasoning
4	To explain the contemporary techniques in machine learning
5	To evaluate the effectiveness of hybridization of different artificial intelligence techniques.
COURSE OUTCOMES	
By the end of the course students shall be able to	
CO1	understand the history, development and various applications of artificial intelligence
CO2	familiarize with propositional and predicate logic and their roles in logic programming
C03	learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems
CO4	understand how uncertainty is being tackled in the knowledge representation and reasoning process, in particular, techniques based on probability theory and possibility theory (fuzzy logic)

UNIT I INTRODUCTION
Intelligent Agents, Agents and environments, Good behavior, The nature of environments, structure of agents, Problem Solving, problem solving agents, example problems, searching for solutions, uniformed search strategies, avoiding repeated states, searching with partial information.

UNIT II SEARCHING
Search and exploration, Informed search strategies, heuristic function, local search algorithms and optimistic problems, local search in continuous spaces, online search agents and unknown environments, Constraint satisfaction problems (CSP), Backtracking search and Local search for CSP, Structure of problems, Adversarial Search, Games: Optimal decisions in games, Alpha- Beta Pruning, imperfect real-time decision, games that include an element of chance.

UNIT III KNOWLEDGE REPRESENTATION
First order logic, representation revisited, Syntax and semantics for first order logic, Using first order logic, Knowledge engineering in first order logic, Inference in First order logic, prepositional versus first order logic, unification and lifting, forward chaining, backward chaining, Resolution, Knowledge representation, Ontological Engineering, Categories and objects, Actions - Simulation and events, Mental events and mental objects.

UNIT IV LEARNING
Learning from observations: forms of learning, Inductive learning, Learning decision \trees, Ensemble learning, Knowledge in learning, Logical formulation of learning, Explanation based learning, Learning using relevant information, Inductive logic programming, Statistical learning methods, Learning with complete data, Learning with hidden variable, EM algorithm, Instance based learning, Neural networks - Reinforcement learning, Passive reinforcement learning, Active reinforcement learning, Generalization in reinforcement learning.

UNIT V PERCEPTION AND EXPERT SYSTEM

Visual perception -Waltz's algorithm, Introduction to Expert System, Architecture and functionality, Example Expert system.

Text Book:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence, A Modern Approach", 2nd Edition, Pearson Education / Prentice Hall of India, 2004.

References:

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw- Hill,
3. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex Problem Solving", Pearson Education / PHI, 2002.
4. Eugene charniak, "Introduction to Artificial Intelligence", Pearson Education.
5. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill Publications

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IV B.TECH – II SEMESTER
Elective - III

Subject Code	Title of the Subject	L	T	P	C
17A80408	Data Compression & Encryption	3	-	-	3

COURSE OBJECTIVES	
1	To understand the different text compression technique
2	To study the various audio compression scheme.
3	To verify different video compression & image compression methods.
4	To have the knowledge of various encryption techniques
5	To acquire the information about different authentication technique.
COURSE OUTCOMES	
By the end of the course, the students shall be able to	
CO1	implement various text, audio, video, compression technique.
CO2	provide various authentication using digital commu
CO3	gain the knowledge of encryption techniques application to digital communication

UNIT I
TEXT COMPRESSION: Shannon Fano Coding, Huffmann coding, Arithmetic coding and dictionary techniques LZW, family algorithms, Entropy measures of performance and Quality measures.

UNIT II
AUDIO COMPRESSION: Digital Audio, Lossy sound compression, μ-law and A-law companding, DPCM and ADPCM audio compression, MPEG audio standard, frequency domain coding, format of compressed data.

UNIT III
IMAGE AND VIDEO COMPRESSION: Lossless techniques of image compression, gray codes, Two dimensional image transforms, JPEG, JPEG 2000, Predictive Techniques PCM and DPCM. Video compression and MPEG industry standard.

UNIT IV
CONVENTIONAL ENCRYPTION: Introduction, Types of attacks, Steganography, Data Encryption Standards, Block Cipher Principle, S-box design, triple DES with two three keys.

UNIT V
PUBLIC KEY ENCRYPTION AND NUMBER THEORY: Euler's theorems, Chinese remainder theorem, Principles of public key cryptography, RSA algorithm, Diffie-Hellman Key Exchange. Elliptic curve cryptology, message authentification and Hash functions, Hash and Mac algorithms, Digital signatures.

Text Books:
1. Data Compression – David Salomon, Springer Publication, 4th Edition.
2. Introduction to Data Compression – Khalid Sayood, Morgan Kaufmann Series, 3rd Edition
3. Cryptography and Network Security – William Stallings, Pearson Education Asia Publication,
4. Cryptography and Network Security – Behrouz Forouzan, McGraw-Hill, 1st Edition.

References:

1. The Data Compression Book – Mark Nelson, BPB publication, 2nd Edition
2. Applied Cryptography – Bruce Schnerer, John Willey & Sons Inc. Publication, 2nd Edition
3. Cryptography & Network Security – Atul Kahate, Tata McGraw Hill, 2nd Edition
4. Cryptography and Network Security – Behrouz A. Forouzan , Special Indian Addition, SIE
5. Network Security & Cryptography – Bernard Menezes, Cenage Learning

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COLLEGE OF ENGINEERING (Autonomous) :; ANANTHAPURAMU
ELECTRONICS AND COMMUNICATION ENGINEERING
IV B.TECH – II SEMESTER
Elective - V

Subject Code	Title of the Subject	L	T	P	C
17A80409	**Cellular & Mobile Communications**	3	-	-	3

COURSE OBJECTIVES	
1	To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
2	To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel.
3	To provide the student with an understanding of Co-channel and Non-Co-channel interferences.
4	To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
5	To give the student an understanding of frequency management, Channel assignment and types of handoff.
COURSE OUTCOMES	
By the end of the course,	
CO1	The student will be able to analyze and design wireless and mobile cellular systems.
CO2	The student will be able to understand impairments due to multipath fading channel.
CO3	The student will be able understand the fundamental techniques to overcome the different fading effects.
CO4	The student will be able to understand Co-channel and Non Co-channel interferences
CO5	The student will be able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas
C06	The student will have an understanding of frequency management, Channel assignment and types of handoff.

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- Fading -Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

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.

UNIT II

Co-Channel Interference:

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.

Non-Co-Channel Interference:

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.

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.

Cell Site and Mobile Antennas:

Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

UNIT IV

Frequency Management and Channel Assignment:

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.

UNIT V

Handoffs and Dropped Calls:

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.
2. Wireless Communications - Theodore. S. Rapport, Pearson Education, 2nd Edn., 2002.
3. Mobile Cellular Communication - Gottapu sashibhushana Rao, Pearson, 2012.

References:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Edn., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher, Pearson Eduction, 2005.
3. Wireless Communications Theory and Techniques, Asrar U. H .Sheikh, Springer, 2004.
4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.
5. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.