CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING

B.E. I – Year

I - Semester

THEORY						
S.No	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	EG 111	English – I	2	0	0	2
2	MT 111	Mathematics – I	3	1	0	3
3	PY 111	Engineering Physics – I	3	0	0	3
4	CY 111	Engineering Chemistry – I	3	0	0	3
5	CS 111	Programming and Problem Solving	3	1	0	3
6	CE 111	Engineering Mechanics – I	3	1	0	3
7	CE 112	Environmental Studies	3	1	0	3
PRACTICALS						
8	EG112	English Language Laboratory – I	0	0	2	1
9	PY 114/ CY 114	Engineering Physics Lab – I/ Engineering Chemistry Lab – I	0	0	3	2
10	CS 114	Programming Lab – I	0	0	3	2
11	ME 114	Workshop	0	0	3	2
TOTAL			**20**	**04**	**11**	**27**

EG 111

ENGLISH –I
(common to all branches)

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:
To enable the students to

- To understand the role and importance of communication and to develop their basic communication skills in English.
- To enable the students to communicate through listening, speaking, reading and writing.
- To achieve a sound foundation and acquaint the students in the basics of grammar.
- To develop vocabulary and to use appropriate idiomatic expressions, one word substitutes etc,.
- To ensure students use learning materials prescribed, and to inculcate the habit of reading for pleasure.
- To enhance imaginative creative and critical thinking through literary texts.
- To enable students to write composition and draft different kinds of letters.

Unit-I
Effective Communication: Role and importance of communication, process of communication, types of communication , barriers to communication, Verbal communication and non verbal communication , formal versus informal communication.

Unit-II
Review of Grammar: 1. Tense and aspect 2. Articles 3. Prepositions 4. Voice 5. Concord 6. Direct and indirect speech
Vocabulary Enhancement: 1. Synonyms 2. Antonyms

Unit-III
Reading comprehension and reading strategies.
Lessons Prescribed: 1. Barack Obama: A Trendsetter 2. Rendezvous with Indra Nooyi
Text based exercises
Vocabulary Enhancement: 1. Homonyms 2. Homophones 3. Homographs 4. Words often confused

Unit-IV
Writing Skills: Paragraph writing, Essay writing , Letter of application, Resume writing, Complaint letter with response.
Vocabulary Enhancement: Idiomatic expressions and one word substitutes.

Unit-V
Soft skills - Introduction to soft skills, soft versus hard skills, professional etiquette in formal and semi formal situations, telephonic etiquette, E-mail etiquette.

Text Books:

1. "Essential English"- E Suresh Kumar et al**.** (Orient Balck Swan PVT Ltd.)
2. "Communication Skills and Soft Skills: An Integrated Approach"- E Suresh Kumar et al**. (**Pearson Publications)

Suggested Reading:

1. "English Vocabulary in Use" - Michael McCarthy (Cambridge University Press)
2. "Developing Communication Skills" – Krishna Mohan & Meera Banerjee (Macmillan)
3. "Murphy's English grammar" (Cambridge University Press)
4. "English Phrasal Verbs in use" - Michael McCarthy (Cambridge University Press)
5. "Written Communication in English" –Sarah Freeman (Orient Longman)
6. "Model Business letters, E-Mails and Other Business Documents" - Shirley, Taylor (Pearson) "Effective Technical Communication" – M. Ashraf Rizvi (Tata- McGraw Hill)
7. "Business Correspondence and Report Writing – R.C Sharma and Krishna Mohan (Tata Mc Graw Hill)
8. Soft Skills, Alex , Publishers S. Chand

MT 111

MATHEMATICS-I
(common to all branches except Biotech)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT-I: Matrices: Rank of a matrix, Echelon form-Normal form-Consistency of a linear system of equations. Eigen values, Eigen vectors- properties (with out proofs). Cayley- Hamilton Theorem (statement only) inverse and powers of a Matrix by Cayley-Hamilton Theorem. Reduction of Quadratic form to Canonical form by linear transformation, rank, positive, negative, definite, semi-definite, index and signature.

UNIT-II: Sequences and Series: Convergence and divergence, ratio test, Comparison test, integral test, Cauchy's root test, Raabes's test-Alternating series, Absolute and conditional convergence, Leibniz's Test (tests without proofs).

UNIT-III: Differential Calculus:
Mean value theorems (statements only) - Rolle's Theorem, Lagrange's theorem, Cauchy's theorem, and generalized mean value theorem (Taylor's Theorem), Geometrical interpretations. Curvature and Radius of curvature, center of curvature, circle of curvature. Evolutes,involutes and Envelopes. Functional dependence, Jacobian, Taylors series in two variables, Maxima and Minima for function of two variables with and without constraints.

UNIT-IV: Integral Calculus: Curve tracing – Cartesian, polar and parametric curves (standard curves only). Double and triple integrals change of order integration, applications of integration, rectification, areas, volumes and surfaces of solids of revolution in Cartesian and polar coordinates.

UNIT-V: Beta and Gamma Functions: Definitions of Beta and Gamma functions-elementary Properties of both Beta and Gamma functions, Relation between Beta and gamma functions, differentiation under the integral sign. Error function, complementary error function, properties Differentiation of error functions.

Text Books:
1. Advanced Engineering by Kreyszig, john wiley & sons -publishers.
2. Mathematical Methods of science and engineering, Aided with MATLAB,Kanti.B.Datta.Cengage Learning India Pvt.Ltd,418 Pratapgang,New Delhi.
3. Mathematics for Engineers and Scientists by Alen Jaffery , 6th edition 2013 CRC press, Taylor & Francis Group.(Elsavier)
4. Advanced Engineering Mathematics by Michael Greenburg, Second Edition –Pearson Education.

Suggested Reading:
1. Mathematics for Engineers-a modern interactive approach by A.Craft and Robert Davison-Willey
2. Applied Mathematics and physicists by Loius Pipes-Mc Graw Hill pubulishers.
3. Advanced Engineering Mathematics by R.K.Jain & S.R.K.Iyenger, 3rd edition, Narosa Publications
4. Matrices for Engineering Dynamics by AR Collar and A. Simpson-John Willey & sons
5. Essential Mathematics for Engineers by W.Bolton-Betterworth and Heineman
6. Mathematical for Physicists and Engineers- L F Landoviz, Publishers- Rienfold Book Corporation.
7. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
8. Engineering Mathematics by B.V.Ramana
9. Calculus by Smith and Minton
10. Applications of Linear Algebra by David.C Lay

PY 111

ENGINEERING PHYSICS – I
(common to all branches except Chemical & Biotech)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Unit – I

Waves and Oscillations: Simple harmonic motion – Differential equation and its solution – Torsional pendulum – Superposition of two mutually perpendicular linear SHMs of same frequency – Lissajous figures – Damped vibrations – Differential equation and its solution – Logarithmic decrement - Relaxation time – Quality factor – Forced vibrations – Differential equation and its solution – Amplitude resonance.

Ultrasonics: Introduction – Production of ultrasonics by piezoelectric and magnetostriction methods – Detection of utrasonics – Determination of ultrasonic velocity in liquids – Engineering applications.

Unit – II

Interference: Introduction – Division of amplitude & division of wavefront – Interference in thin films (reflected light) – Newton's rings – Fresnel's biprism.

Diffraction: Introduction – Distinction between Fresnel and Fraunhoffer diffraction – Diffraction at single slit & double slit – Diffraction grating (N Slits).

Unit – III

Polarization: Introduction – Brewster's law – Malus's law – Double refraction – Nicol's prism – Quarter & Half wave plates – Optical activity – Laurent's half shade polarimeter.

Lasers & Holography: Introduction – Characteristics of lasers – Spontaneous & stimulated emission of radiation – Einstein's coefficients – Population inversion – Ruby laser – He-Ne laser – Semiconductor laser – Applications.

Basic principle of Holography – Recording & Reconstruction of hologram – Applications.

Unit - IV

Electromagnetic Theory: Review of steady and varying fields – Conduction and displacement current – Maxwell's equations in differential and integral forms – Electromagnetic wave propagation in free space, dielectric and conducting media – Poynting theorem.

Fibre Optics: Introduction – Types of optical fibres – Propagation of light through an optical fibre – Acceptance angle – Numerical aperture – Pulse dispersion – Fibre materials – Fibre drawing process by double crucible method – Applications.

Unit – V

Elements of Statistical Mechanics: Introduction – Ensembles – Phase space – Thermodynamical probability – Boltzmann theorem on entropy – Maxwell-Boltzmann, Bose-Einstein & Fermi-Dirac statistics – Photon gas – Planck's' law of black body radiation – Wien's law and Rayleigh-Jean's law from Planck's law.

Text Books:

1. M.N. Avadhanulu and P.G. Kshirsagar, *A Text Book Engineering Physics*, S. Chand Publications, 2014
2. S.L. Gupta and Sanjeev Gupta, *Modern Engineering Physics*, Dhanpat Rai Publications, 2011
3. V. Rajendran, *Engineering Physics*, McGahill Education Publications, 2013

Suggested Reading:

1. R. Murugeshan and Kiruthiga Sivaprasath, *Modern Physics*, S. Chand Publications S. Chand Publications, 2005
2. M. Arumugam, *Materials Science*, Anuradha Publications, 2002.
3. Satyaprakash and Agarwal, *Statistical mechanics*, Kedannath Publications
4. P.K. Palanisamy, *Engineering Physics*, Scitech Publications, 2012
5. Hitendra K Malik and A.K. Singh, *Engineering Physics*, Tata McGahill Education Publications, 2011

CY 111

ENGINEERING CHEMISTRY - I
(common to all branches except Chemical & Biotech)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry like other subjects is the real base of his profession and that therefore he must have a good understanding of chemistry before he can use it in his profession. The various units of the syllabus is so designed to fulfill the following objectives.

1. Thermodynamics and Electrochemistry units give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. It also discusses the devices used for electrical energy storage and captive generation and tapping it as and when required.
2. "Those who control materials control technology". Newer materials lead to discovering of technologies in strategic areas like defense and space research. Recently modern materials synthesized find applications in industry and creating instruments for solving problems of electronics, telecommunications, health care, agriculture, and technology etc., Inorder to emphasize the above the topics like composite materials, polymers, conducting polymers and nano materials have been incorporated in the curriculum.
3. Knowledge to prevent corrosion of machinery and metallic materials and water chemistry which require serious attention in view of increasing pollution has been included in the syllabus.
4. Fuels have been taught with a view to give awareness as to materials which can be used as sources of energy and fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
5. To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics.
6. To enable students to apply the knowledge acquired in improving the properties of engineering materials.
   The engineer who has the above background can effectively manage the materials in his designing applications and discovering and improving the systems for various uses in industry, agriculture, health care, technology, telecommunications, electronics and instruments detecting in advance in natural calamities. The above knowledge also helps students to carry out inter disciplinary research such that the findings benefit the common man.

UNIT – I

Chemical Thermodynamics – I:

The concept of reversible and irreversible process, Work done in isothermal and adiabatic reversible and irreversible process, Success and limitations of First law of thermodynamics, need for second law of thermodynamics, statements of second law of thermodynamics, Carnot cycle, heat engine and its efficiency, Carnot theorem, numericals.

UNIT – II

Chemical Thermodynamics - II & Phase Rule:

Concept of Entropy – Entropy changes in reversible and irreversible processes, physical significance of entropy, Helmholtz free energy and Gibb's free energy functions, chemical potential, criteria of spontaneity in terms of entropy and Gibb's free energy function, Gibb's – Helmholtz equation and its applications, numericals.

Phase rule – Terminology, phase diagram – one component system (water system).

UNIT – III

Fuels – I:

Classification, requirements of a good fuel, calorific value, types of calorific value, relation between HCV & LCV and numericals. Determination of calorific value by Bomb calorimeter, Dulong's formula, numericals.

Combustion, ignition temperature of fuel, calculation of air quantities by weight and volume required for combustion of fuel, numericals.

Solid fuels: coal and its chemical composition, analysis of coal – proximate and ultimate analysis, importance.

UNIT – IV

High Polymers:

Definition of polymer, degree of polymerization. Thermo plastics and thermo sets. Molecular weight – number average and weight average. Determination of molecular weight of a polymer by viscosity method.

Preparation, properties and uses of plastics (Polyvinyl chloride, Bakelite), fibers (Kevlar, polyurethane), Rubbers – natural rubber and its chemical structure, vulcanization and its significance.

Preparation, properties and uses of silicone rubber, conducting polymers – definition, classification and applications.

UNIT –V

Engineering Materials:

Nano materials – Introduction to nano materials and general applications, basic chemical methods of preparation – Sol-gel and hydrothermal methods. Carbon nanotubes and their applications.

Powder X-ray diffraction- particle size estimation (Scherrers equation)

Composite materials – definition, types of composites, fibre reinforced, glass fibre reinforced and carbon fibre reinforced composites and applications.

Text Books:

1. J.C. Kuriacase & J. Rajaram, "Chemistry in engineering and Technology", Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
2. S.S.Dara & S.S.Umare, "Engineering Chemistry", S.Chand company.
3. ShasiChawla, "Text Book of Engineering Chemistry", Dhantpat Rai Publishing Company, NewDelhi (2008).
4. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002).
5. Puri & Sharma, "Principles of Physical Chemistry
6. P.R.Vijayasarathi, "Engineering Chemistry" PHI Learning Private Limited, New Delhi (2011).

Suggested Reading:

1. Physical chemistry by P.W.Atkin (ELBS OXFORD PRESS)
2. Physical chemistry by W.J.Moore (Orient Longman)
3. Physical Chemistry by Glasstone
4. Physical Chemistry by T.Engel & Philip Reid, Pearson Publication.
5. Introduction to nano materials by T.Pradeep.

CS 111

PROGRAMMING AND PROBLEM SOLVING
(common to CSE, IT, ECE, EEE & Biotech)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Unit-I

Introduction to computers: Hardware Components, Functional block diagram, Operating Systems, Program Development Environments.

Programming languages: System Programming, Application Programming, Low-level, High-level, Classification of Programming languages.

Translators: Compiler, Interpreter, Loader and Linker.

Number Systems: Representation of Binary, Octal and Hexadecimal Numbers, Conversions, Negative Binary Numbers, Fractional Numbers.

Unit-II

Problem solving: Algorithm: Key Features of an Algorithm, Strategy for designing an Algorithm. Tracing an Algorithm to depict logic. Specification for converting algorithms to programs, Flow chart and Pseudo codes.

Introduction to C Programming: Standardizations, Developing Programs In C, Parts and structure of C Program, character set ,Variable, Data types ,Statement, Declaration, Token, Operators and Expressions.

Unit-III

Control Structures: Test Condition for Selection and Iteration, Conditional Execution and Selection, Iteration and Repetitive Execution, Break, Continue and go to statement, Nested Loops.

Functions: Concept of Functions, Types of functions, Parameter passing techniques, Scope and Extent, Storage Classes, Recursion.

Case Studies on Control structures and Functions (Tutorial Purpose only).

Unit-IV:

Arrays: Declaration, Initialization, Accessing Array Elements, Internal Representation and Variable Length Arrays of One-dimensional Array and Multidimensional Arrays, Passing Arrays to Functions, Searching and Sorting.

Pointers: Address Operator (&),Declaring and Initializing Pointers, Indirection Operator and Dereferencing, Pointer Arithmetic, Pointers to Pointers, Array of Pointers, Pointers to Functions, Dynamic Memory Allocation, Command Line Arguments.

Case Studies on Arrays and Pointers (Tutorial Purpose only).

Unit-V:

User-defined Data Types and Variables: Structures , Declaring Structures and Structure Variables, Accessing the members of a Structure , Initialization, Nesting of Structures, Arrays of Structures, Structures and Pointers, Structures and Functions, Union, Enumeration Types.

File Processing: Working with Text and Binary Files, Sequential and Random Access File, Files of Records.

A Case Study on Files (Tutorial Purpose only).

Text Books:

1. Pradip Dey and Manas Ghosh "Programming in C 2/e" Oxford University Press , 2nd Edition 2011.
2. B. W. Kernighan & D.M. Ritchie, "The 'C' Programming Language" Prentice Hall India, 2nd Edition. 1990.
3. R S Bichkar "Programming with C "University Press, 2012.

Suggested Reading:

1. Rajaraman V. "The Fundamentals of Computers" 4th Edition, Prentice Hall of India, 2006.
2. Behrouz A .Forouzan, Richard F.Gilberg "Computer Science : A Structured Programming Approach using C" Cengage Publishers, 2006.

CE 111

ENGINEERING MECHANICS - 1
(common to all branches)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

- To provide fundamental understanding of any anatomy for which Engineering Mechanics forms the basis.
- To understand the concept of force transfer, necessary conditions of equilibrium, significance of friction and geometric properties in statics.
- To equip the students to apply the principles learnt for the analysis of structures and equipments.

Unit - I

Force Systems: Resolution of coplanar and non-coplanar force systems (both concurrent and non-concurrent), Determining the resultant of all force systems using scalar and vector concepts. Moment of force and its applications.

Unit – II

Equilibrium of force system: Free body diagrams, equations of equilibrium of planar force systems. Equilibrium of spatial force systems.

Unit – III

Theory of friction: Introduction, types of friction, laws of friction, application of friction to a single body & connecting systems. Wedge and belt friction.

Unit – IV

Centroids: Significance of centroids, moment of area, centroids of line elements, plane areas, composite areas, theorems of Pappus & its applications.

Unit – V

Area Moment of Inertia: Definition, polar moment of Inertia, radius of gyration, transfer theorem, moment of Inertia of plane & composite areas, product of inertia, transfer formula for product of inertia.

Text Books:

1. K. Vijay Kumar Reddy and J. Suresh Kumar, *Singer's Engineering Mechanics*, BS Publications, Hyderabad, 2011.
2. Ferdinand L Singer, *Engineering Mechanics*, Harper and Collins, Singapore, 1904.

Suggested Reading:

1. A. Nelson, *Engineering Mechanics*, Tata McGraw Hill, New Delhi, 2010.
2. S. Rajashekaran & G. Sankarasubramanyam, *Engineering Mechanics*, Vikas publications, Hyderabad, 2002.
3. S.B. Junarkar and H.J Shah, *Applied Mechanics***,** Charotar publishers, New Delhi, 2001.
4. Basudeb Bhattacharyya, *Engineering Mechanics*, Oxford University Press, New Delhi, 2008.
5. K.L Kumar & Veenu Kumar, *Engineering Mechanics*, Tata McGraw Hill, New Delhi, 2011.

CE 112

ENVIRONMENTAL STUDIES
(common to all branches)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To equip the students with inputs on the environment, natural resources, ecosystems and Bio-diversity.
2. To enable the students become aware of environmental pollutions, causes, effects and control measures.
3. To make the students contribute for capacity building of nation for arresting and/or managing environmental disasters.

UNIT – I

Environmental Studies Definition, Scope and importance, need for public awareness. Natural resources: Water resources, use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Effects of modern agriculture, fertilizer pesticide problems, water logging salinity. Energy resources; growing energy needs, renewable and non-renewable energy sources. Land resources; land as a resource, land degradation, soil erosion and desertification.

UNIT – II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, ecological pyramids, aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT – III

Biodiversity: Genetic species and ecosystem diversity, biogeographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT – IV

Environmental Pollution: Cause, effects and control measures of air pollution, water pollution,
soil pollutions, noise pollution, thermal pollution and solid waste management. Environment protection act: Air, water, forest & wild life acts, issues involved in enforcement of environmental legislation.

UNIT – V

Social issues and the environment: Water conservation, watershed management, and environmental ethics. Climate change; global warming, acid rain, ozone layer depletion, Environmental protection act, population explosion.
Disaster Management: Types of disasters, impact of disasters on environment, infrastructure and development, Basic principles of disaster mitigation, disaster management, and methodology disaster management cycle and disaster management in India

Text Books:

1. Y. Anjaneyulu, Introduction to Environmental Science, B.S. Publications, 2004
2. S.S.Dara, A Text book of Environmental Chemistry & Pollution Control, S.Chand & Comp. Ltd, 2000.

Suggested Readings:

1. De A.K. *Environmental Chemistry*, Wiley Eastern Ltd., 1989.
2. Odum E.P. *Fundamentals of Ecology*, W.B. Saunders Co., USA, 1975.
3. Rao M.N. and Datta A.K., *Wastewater treatment*, Oxford & IBH publishing Co., 1987.
4. Miller T.G. Jr. Environmental Science, Wordsworth Publishing Co., 1984.
5. Benny Joseph, Environmental Studies, Tata Mc. Graw Hill education Pvt. Ltd., 2000
6. Raman Siva Kumar, Introduction to environmental Science and Engineering, Tata Mc. Graw Hill education Pvt. Ltd., 2010.

EG 112

ENGLISH LANGUAGE LABORATORY – I
(common to all branches)

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	1

Comuter Assisted Language Learning Lab (CALL)

Introduction:
The language lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.
The following are the **objectives** of the course:

1. To make students recognize the sounds of English through audio – visual aids and computer software.
2. To help them overcome their inhibitions and self consciousness while speaking in English and to build their confidence. The focus shall be on fluency rather than accuracy.
3. To enable them to speak English correctly with focus on stress and intonation.
4. To expose the students to a variety of self instructional, learner friendly modes of communication.

Syllabus:
1. Introduction to English Phonetics: Introduction to auditory, acoustic and articulatory phonetics, organs of speech: the respiratory, articulatory and phonatory systems.
2. Sound system of English: Phonetic sounds and phonemic sounds, introduction to international phonetic alphabet, classification and description of English phonemic sounds, minimal pairs. The syllable : types of syllables, consonant clusters.
3. Aspects of connected speech: Strong forms, weak forms, contracted forms, elision.

Interactive Communication Skills Lab (ICS LAB)

Introduction:

The objective of the course is to enrich interpretation skills, problem solving skills, interpersonal skills, analytical skills and leadership skills of the students, the most essential requirement of communication skills for Engineering students. The course lays emphasis on the language integrated skills in simple and comprehensive manner.
The following are the **objectives** of the course:

1. To expose the students to a team environment and how best one works with teams while adapting themselves to a corporate environment and to make business presentations.
2. Use proper body language expressions in presentation and speeches.
3. Depict situations in the dialogue that are relevant and useful to the learner, retain the truth value in the dialogue.
4. Public speaking is to be shown in action by incorporating narrative examples and extracts from speeches relating directly to students actual life experiences.

Syllabus:

1. Situational dialogues & role plays.
2. Group discussions: Objectives of a GD, types of GD's, initiating, continuing and concluding of GD.
3. Public speaking: Advantages of public speaking, essentials of an effective speech, rehearsal techniques, planning and delivering speeches.

Suggested Reading:

1. E Suresh Kumar et al**. English for Success**(with CD), Cambridge University Press India Pvt Ltd. 2010.
2. T Balasubramanian**. A Textbook of English Phonetics for Indian Students**, Macmillan, 2008.
3. Kavita Tyagi and Padma Misra. **Professional Communication**, PHI Learning Pvt Ltd, 2011
4. J Sethi et al. **A Practical Course in English Pronunciation** (with CD), Prentice Hall India, 2005.
5. Meenakshi Raman and Sangeeta Sharma**. Technical Communication**, Oxford Universuty Press 2009.

PY 114

ENGINEERING PHYSICS LAB - I
(common to all branches except Chemical)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

1. Error Analysis – Estimation of errors in the determination of time period of a torsional pendulum
2. Newton's Rings – Determination of wavelength of given monochromatic source
3. Single Slit Diffraction – Determination of wavelength of given monochromatic source
4. Diffraction Grating – Determination of wavelengths of two yellow lines of mercury light
5. Malus's Law – Verification of Malus's law
6. Double Refraction – Determination of refractive indices of O-ray and E-ray of given calcite crystal
7. Polarimeter – Determination of specific rotation of glucose
8. Laser – Determination of wavelength of given semiconductor red laser
9. Fibre Optics – Determination of NA and power losses of given optical fibre
10. Recording & Reconstruction of Hologram

CY 114

ENGINEERING CHEMISTRY LAB - I
(common to all branches except Chemical & Biotech)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To impart fundamental knowledge in handling the equipment/glassware and chemicals in the chemistry laboratory.
2. To offer hands on experience on the basic equipment related to engineering chemistry.
3. For practical understanding of theoretical concepts of chemistry

I. Volumetric Analysis:

1. Introduction to volumetric analysis and Techniques of weighing and usage of analytical balance.
2. Estimation of amount of ferrous ion using $K_2Cr_2O_7$ solution.
3. Estimation of Carbonate and Bicarbonate in the given solution using HCL (Link) Solution

II. Kinetics:

4. Hydrolysis of methyl acetate in acidic medium.

III. Organic Polymers:

5. Preparation of urea – formaldehyde / phenol- formaldehyde resin.

IV. Instrumental Chemical Analysis:

i**) Conductometric Titrations:**

6. Strong acid vs strong base.
7. Mixture of strong acid and weak acid vs strong base.

ii) Colorimetry:

8. Determination of concentration of given $K_2Cr_2O_7$ solution.
9. Determination of concentration of given $KMnO_4$ solution.
10. Determination of viscosity of sample oil by Redwood viscometer.

Text Books:

1. Vogel's text book of quantitative chemical analysis by J.Mendham and Thomas, Person education Pvt.Ltd.New Delhi 6th ed.2002.
2. Senior practical physical chemistry by BD Khosla, A.Ghulati, VC.Garg; R.Chand and CD; NewDelhi 10th edition
3. Laboratory manual in engineering chemistry by S.K.Bhasin and Sudha Rani; Dhanpath Rai Publishing company

CS 114

PROGRAMMING LAB- I
(common to all except Chemical)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

1. Identify the hardware components, assembling of computers.

2. Basic of OS commands, Installation of OS (Linux, DOS and XP).

3. Familiarization of Editors.

4. Sin x and Cos x values using Series expansion.

5. Demonstration of switch case (menu driven).

6. Demonstration of Parameter passing in Functions.

7. Demonstration of Functions using Recursion.

7. Program to count No of lines, characters, blanks, tab and special characters.

8. Demonstration of arrays

    (i)Search-Linear.

    (ii)Sorting-Bubble, Selection.

    (iii)Operations on Matrix.

9. Generation of address labels using structures.

10. Implementation of string manipulation operations with and without library function.

11. Sequential file operations.

12. Random Access File Operations.

ME 114

WORKSHOP
(common to CSE, IT, ECE & EEE)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Trades For Practice

1. **Carpentry**	**2. Plumbing**	3. **House Wiring**	**4. Tin Smithy & Soldering**

Exercises in Carpentry

1. To plane the given wooden piece to required size
2. To make a cross lap joint on the given wooden piece according to the given dimensions.
3. To make a Tee lap joint on the given wooden piece according to the given dimensions.
4. To make a dove tail-joint on the given wooden piece according to the given dimensions.
5. To make a bridle joint on the given wooden piece according to the given dimensions.

Exercises in Plumbing

1. To make external threads for GI pipes using dies.
2. To connect the GI pipes as per the given diagram using taps, couplings & bends.
3. To connect the GI pipes as per the given diagram using, couplings, unions, reducer & bends.
4. To connect the GI pipes as per the given diagram using shower, tap & valves
5. Demonstration of above exercise by giving water connection.

Exercises in House Wiring

1. Wiring of one light point controlled by one single pole switch, a three pin socket controlled by a single pole switch, and wiring of one buzzer controlled by a bell push.
2. Wiring of two light points connected in series and controlled by single pole switch. Verify the above circuit with different bulbs.
3. Wiring of two light points connected in parallel from two single pole switches and a three pin socket
4. Stair case wiring-wiring of one light point controlled from two different places independently using two 2-way switches.
5. Go-down wiring.

Exercises in Tin Smithy

1. To make a square tray from the given sheet metal.
2. To make a rectangular box from the given from the sheet metal with base and top open. Solder the corners.
3. To make a scoop.
4. To make a dust pan from the given sheet metal.
5. To make a pamphlet box.

Demonstration of BOSCH tools.

Note: A minimum of 12 exercises from the above need to be done

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING

B. E. I – Year

I – Semester

THEORY						
S.No	**Code**	**Subject**	**L**	**T**	**P/D**	**Credits**
1	EG 111	English - I	2	0	0	2
2	MT 111	Mathematics - I	3	1	0	3
3	PY 111	Engineering Physics - I	3	0	0	3
4	CY 111	Engineering Chemistry - I	3	0	0	3
5	CS 111	Programming and Problem Solving	3	1	0	3
6	CE 111	Engineering Mechanics - I	3	1	0	3
7	CE 112	Environmental Studies	3	1	0	3
PRACTICALS						
8	EG112	English Language Laboratory – I	0	0	2	1
9	PY114/ CY114	Engineering Physics Lab – I/ Engineering Chemistry Lab – I	0	0	3	2
10	CS 114	Programming Lab – I	0	0	3	2
11	ME114	Workshop	0	0	3	2
TOTAL			**20**	**04**	**11**	**27**

II – Semester

THEORY						
S.No	**Code**	**Subject**	**L**	**T**	**P/D**	**Credits**
1	EG 121	English - II	2	0	0	2
2	MT 121	Mathematics - II	3	1	0	3
3	PY 122	Applied Physics	3	0	0	3
4	CY 121	Engineering Chemistry - II	3	0	0	3
5	CS 121	Object Oriented Programming through C++	3	1	0	3
6	EC 121	Network Theory	3	1	0	3
7	ME 112	Engineering Graphics	1	0	3	3
PRACTICALS						
8	EG 122	English Language Laboratory – II	0	0	2	1
9	PY 125 / CY 123	Engineering Physics Lab – II / Engineering Chemistry Lab – II	0	0	3	2
10	CS 122	Programming lab - II	0	0	3	2
11	EC 122	Networks Lab	0	0	3	2
TOTAL			**18**	**03**	**14**	**27**

EG 121

ENGLISH – II
(common to all branches)

Instruction	2L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

- To understand the difference between oral and written communication, interpersonal and intrapersonal communication
- To acquaint the students with the process of technical writing through different types of reports and information transfer.
- To enhance the different sub- skills of reading through skimming and scanning.
- To enhance imaginative, creative and critical thinking through literary texts.
- To help students develop their Presentation skills through AV aids and different aspects of body language.

UNIT- I

Effective communication: Intrapersonal communication, Interpersonal communication, Dyadic Communication, One way versus two way communication and Johari Window.

UNIT- II

Grammer Practice: Common errors in English ad, Punctuation.

Vocabulary Enhancement:

Indian and American usage, Words often misspelt, Prefixes & Suffixes, technical vocabulary

Prose: Muthyala Raju Revu: An Engineer Turned IAS Officer.

UNIT- III

Writing Skills: Reports, Technical Report Writing, Information transfer: Flow charts, piecharts, graphs and scientific papers

UNIT- IV

Reading comprehension – Unknown passages, Skimming and Scanning, intensive reading and critical analysis.

Prose: R. Madhavan : Engineering to Farming

UNIT- V

Soft Skills: Presentation skills – Rubrics, use of AV aids and making of a Power Point Presentation, Body Language. Leadership skills and Team Building.

Text Books:

1. "Essential English"- E Suresh Kumar et al**.(**Orient Black Swan PVT Ltd.)
2. "Communication Skills and Soft Skills: An Integrated Approach"- E Suresh Kumar et al**. (**Pearson Publications)

Suggested Reading:

1. " High School English Grammar & Composition" – Wren and Martin (S.Chand)
2. "ABC of Common Grammatical Errors" – Nigel D Turton (Macmillan)
3. "Communication Skills & Soft Skills" – An Integrated approach – E Suresh Kumar (Pearson)
4. "Examine your English" – Margaret M Maison (Orient Longman)
5. "Professional Presentation" – Malcolm Goodale (Cambridge University Press)
6. "English Grammar at alance" – M. Gnanamurali (S. Chand)
7. "Business Communication & Soft skills" (Lab Manual) – D. Sudha Rani (Pearson)
8. "A Course Book in English" – K.R. Lakshminarayan (SciTech Publication)
9. "Effective Technical Communication" – M. Ashraf Rizvi (Tata- McGraw Hill)

MT 121

MATHEMATICS – II
(common to all branches except Bio-Tech)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT- I

Ordinary differential Equations: Exact Differential equations (integrating Factors) Applications differential equations-Orthogonal trajectories-Problems on oscillatory electrical circuits (LC and LCR circuits). Linear Differential equations of higher order with constant coefficients, complementary function and particular integrals when RHS is of the forms e^{ax}, sinax, cosax, x^m, $e^{ax}(v)$, $x^m(v)$, where v-is a function of 'x', Legender's and Cauchy's form of Homogeneous equations.

UNIT- II

Laplace Transforms: Definition of integral transform, domain of the function and kernel of the Laplace transforms. Existence of Laplace transforms. Properties- Laplace transforms of standard functions, Laplace transforms of piecewise continuous functions, first and second shifting theorems, multiplication by 't', division by 't'. Laplace transforms of derivatives and integrals of functions-Unit step function- Periodic functions (without proofs). Inverse Laplace transforms-by partial fractions (Heaviside method), Residue method-Convolution Theorem. Solving Ordinary differential equations by Laplace Transforms

UNIT- III

Series solution of Differential equations: Introduction-ordinary and singular points of an equation-power series solution- Solution of Legender equation (without proof)- Legendre polynomials-Rodrigue'sformula-Generating function of Legender polynomials-Recurrence relations- orthogonal property.

UNIT- IV

Vector Differentiation: Scalar and vector fields- directional derivative- Gradient of a scalar-Divergence and Curl of a vector point function. Properties of divergence, curl - vector identities. Solenoidal and Irrotational vectors.

UNIT-V

Vector Integration: Vector Line integrals, surface integrals and volume integrals
Greens Theorem, Gauss divergence Theorem and Stokes theorem (without proofs)
Applications of Integration-problems based on verification and evaluation using the above theorems (for cube, rectangular parallelepiped, sphere, cylinder)

Text Books:

1. Advanced Engineering by Kreyszig, John Wiley & Sons -Publishers.
2. Mathematical Methods of Science & Engg, Aided with MATLAB, Kanti.B.Datta. Cengage Learning India Pvt.Ltd.
3. Mathematics for Engineers and Scientists by Alen Jaffery , 6th ed 2013 CRC press,Taylor & Francis Group. (Elsevier)
4. Advanced Engineering Mathematics by Michael Greenburg, Second Edition –Pearson Education.

Suggested Reading: (for further reading and examples on applications)

1. Mathematics for Engineers-a modern interactive approach by A.Craft and Robert Davison-Willey
2. Applied Mathematics and physicists by Loius Pipes-Mc Graw Hill pubulishers.
3. Advanced Engineering Mathematics by R.K.Jain & S.R.K.Iyenger, 3rd edition, Narosa Publications
4. Matrices for Engineering Dynamics by AR Collar and A. Simpson-John Willey & sons
5. Essential Mathematics for Engineers by W.Bolton-Betterworth and Heineman
6. Mathematical for Physicists and Engineers- L F Landoviz, Publishers- Rienfold Book Corporation.
7. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
8. Engineering Mathematics by B.V.Ramana
9. Calculus by Smith and Minton
10. Applications of Linear Algebra by David.C Lay

PY 122

APPLIED PHYSICS
(common to CSE, IT, ECE & EEE)

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT – I

Elements of Quantum Mechanics:

Introduction – Dual nature of light – de Broglie's hypothesis – Expression for de Broglie's wave length – Heisenberg's uncertainty principle and its illustration (diffraction of a beam of electron at a slit) – Schrödinger time independent and time dependent wave equations – Interpretation of wave function – Infinite square well potential (particle in a box) – Potential step – Potential barrier (qualitative) – Tunneling effect.

UNIT – II

Crystallography: Space lattice – Unit cell – Crystal systems – Bravais lattices – Number of atoms per unit cell – Coordination number – Atomic radius – Packing fraction (for SC, BCC, FCC) – Lattice planes – Miller indices – Bragg's law – Experimental determination of lattice constant of cubic crystals by powder diffraction method.

Crystal Defects: Classification of defects – Point defects – Concentration of Schottky & Frenkel defects.

UNIT – III

Band Theory of Solids: Salient features of classical free electron theory – Energy band formation in solids – Kronig-Penny model (qualitative) – Classification of solids into conductors, semiconductors and insulators.

Semiconductors: Intrinsic and extrinsic semiconductors – Concept of hole – Concept of Fermi level – Carrier concentration in intrinsic semiconductors – Conductivity in semiconductors – Hall Effect in semiconductors.

UNIT – IV

Magnetic Materials: Classification of magnetic materials: dia, para, ferro, anti-ferro and ferrimagnetic materials – Weiss molecular field theory – Domain theory – Hysteresis curve – Soft and hard magnetic materials.

Dielectric Materials: Introduction – Dielectric polarization – Types of dielectric polarization: electronic, ioninc, orientation and space-charge polarization (qualitative) – Frequency and temperature dependence of dielectric polarization – Determination of dielectric constant (Schering bridge method) – Ferroelectricity – Barium titanate – Applications of ferroelectrics.

UNIT – V

Superconductors: Introduction – General properties of superconductors – Meissner's effect – Type I and Type II superconductors – BCS theory (qualitative) – Applications.

Thin Films: Distinction between bulk, thin and nanofilms – Thin film preparation techniques – Physical vapor deposition (PVD) techniques – Thermal evaporation – Electron beam evaporation – Pulsed laser deposition – Applications of thin films – Solar cell – Gas sensor.

Nanomaterials: Zero dimensional materials – Properties of materials at reduced size – Surface to volume ratio – Quantum confinement – Preparation of nanomaterials – Bottom-up methods: Sol-gel, Sputtering and Chemical vapor deposition (CVD) – Top-down methods: Ball milling – Elementary ideas of carbon nanotubes – Applications.

Text Books:

1. M.N. Avadhanulu and P.G. Kshirsagar, *A Text BookEngineering Physics*, S. Chand Publications, 2014
2. S.L. Gupta and Sanjeev Gupta, *Modern Engineering Physics*, DhanpatRai Publications, 2011
3. V. Rajendran, *Engineering Physics*, McGahill Education Publications, 2013

Suggested Reading:

1. R. Murugeshan and KiruthigaSivaprasath, *Modern Physics*, S. Chand Publications, 2005
2. M. Arumugam, *Materials Science*, Anuradha Publications, 2002.
3. Satyaprakash and Agarwal, *Statistical mechanics*, Kedannath Publications
4. P.K. Palanisamy, *Engineering Physics*, Scitech Publications, 2012
5. Hitendra K Malik and A.K. Singh, *Engineering Physics*, Tata McGahill Education Publications, 2011

CY 121

ENGINEERING CHEMISTRY - II
(common to all branches except Chemical Engg & Bio-Tech)

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry like other subjects is the real base of his profession and that therefore he must have a good understanding of chemistry before he can use it in his profession. The various units of the syllabus is so designed to fulfill the following objectives.

1. Thermodynamics and Electrochemistry units give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. It also includes the devices used for electrical energy storage and captive generation and tapping it as and when required.
2. Newer materials lead to discovering of technologies in strategic areas like defense and space research. Recently modern materials synthesized find applications in industry and creating instruments for solving problems of electronics, telecommunications, health care, agriculture, and technology etc., Inorder to emphasize the above the topics like composite materials, polymers, conducting polymers and nano materials have been incorporated in the curriculum.
3. Knowledge to prevent corrosion of machinery and metallic materials and water chemistry which require serious attention in view of increasing pollution has been included in the syllabus.
4. Fuels have been taught with a view to give awareness as to materials which can be used as sources of energy and fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
5. To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics.
6. To enable students to apply the knowledge acquired in improving the properties of engineering materials.

The engineer who has the above background can effectively manage the materials in his designing applications and discovering and improving the systems for various uses in industry, agriculture, health care, technology, telecommunications, electronics and instruments detecting in advance in natural calamities. The above knowledge also helps students to carry out inter disciplinary research such that the findings benefit the common man.

UNIT – I

Electrochemistry

Introduction, construction of electrochemical cell, sign convention, cell notation, cell emf, SOP and SRP, electrochemical series and its applications

Activity, fugacity, Nernst equation and applications, numericals

Types of Electrodes – Standard Hydrogen Electrode, Saturated Calomel Electrode, Quinhydrone electrode and Ion selective electrode (Glass electrode), construction

UNIT – II

Corrosion Science

Introduction, causes and effects of corrosion, chemical and electro chemical corrosion, mechanism of electro chemical corrosion

Galvanic corrosion and types of differential aeration corrosion (pitting and waterline corrosion)

Factors affecting corrosion (position of the metals in galvanic series, relative areas of anode and cathode, nature of corrosion product – solubility and volatility of corrosion product, nature of corroding environment – temperature, humidity and P^H).

Corrosion control methods – cathodic protection, sacrificial anodic protection and impressed current cathodic protection.

Protective coatings – Anodic and cathodic coatings

Paints, constituents and their functions

UNIT – III

Water Chemistry

Hardness of water – Types, units of hardness, estimation of temporary and permanent hardness of water by EDTA method, alkalinity of water and its determination

Numericals on hardness and alkalinity

Specifications of potable water, disinfection of water by chlorination, break point chlorination and by ozone treatment

Desalination of water by reverse osmosis and electro dialysis

UNIT – IV

Fuels – II

Liquid fuels, fractional distillation of crude oil, cracking and significance, catalytic cracking by fixed bed cracking, knocking, significance, antiknocking agents (TEL, MTBE), octane number, cetane number, unleaded petrol.

Gaseous fuels, LPG, CNG, composition and uses, automobile exhaust – catalytic converter.

Battery Technology

Types of batteries, Lithium battery and Lithium ion battery, fuel cell – MeOH – Oxygen fuel cell, H_2-O_2 fuel cell Rocket propellants, requirements of a good propellant, classification, solid-liquid propellants with examples. Photo catalysis

UNIT –V

Instrumental Techniques in Chemical Analysis

Principle, method and applications of Conductometry (acid-base titration), Potentiometry (acid-base, redox titration), P^H-metry (acid – base titration), UV, Visible Spectro photometer (Beer-Lambert's Law), examples

Atomic absorption spectroscopy-Principle, instrumentation (Block Diagram only), estimation of Nickel by Atomic absorption spectroscopy

Text Books:

1. J.C. Kuriacase & J. Rajaram, "Chemistry in engineering and Technology", Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008)
2. S.S.Dara & S.S.Umare, "Engineering Chemistry", S.Chand company
3. ShasiChawla, "Text Book of Engineering Chemistry", Dhantpat Rai Publishing Company, NewDelhi (2008)
4. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
5. Puri & Sharma, "Principles of Physical Chemistry
6. P.R.Vijayasarathi, "Engineering Chemistry" PHI Learning Private Limited, New Delhi (2011)

Suggested Reading:

1. Physical chemistry by P.W.Atkin (ELBS OXFORD PRESS)
2. Physical chemistry by W.J.Moore (Orient Longman)
3. Physical Chemistry by Glasstone
4. Physical Chemistry by T.Engel & Philip Reid, Pearson Publication
5. Introduction to nano materials by T.Pradeep

CS 121

OBJECT ORIENTED PROGRAMMING THROUGH C++
(common for all branches)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT- I

Principles of Object Oriented Programming: Procedure Vs Object Oriented, Paradigm, Basic concepts, benefits, Applications and Object Oriented Languages.

Introduction: Program structure, Creating, Compiling and Linking of C++ program.

Token, Expression and Control Structures: Tokens, Keywords, Identifiers and Constants, Data Types, Operators, Precedence, Type Compatibility, Control Structures, New Features of C++.

Functions: Function Prototype and Parameter Passing, Inline Functions, Default, Constant Arguments, Recursion, Function Overloading, Function Template.

UNIT - II

Classes and Objects: Defining classes and Member functions, Arrays, Static Members, Friend Functions.

Constructors and Destructors: Type of Constructors, Dynamic Initialization of Objects, Destructors.

UNIT - III

C++ operator overloading: Fundamentals, restrictions, overloading unary / binary operators, overloading ++ and --, Manipulation of Strings.

C++ Inheritance: Defining derived classes, Types of Inheritance, Virtual Base class Abstract Class, Nesting of classes.

UNIT- IV

Pointers and Polymorphism: Pointers and Generic pointer, Pointer to Objects and Derived Classes, this pointer, Virtual Functions, Virtual Destructors.

C++ Stream Input/Output: Streams, Stream classes, Formatted and Unformatted operations, Manipulators.

Files: Classes for file Stream operations, Sequential and Random access operations, Command line Arguments

UNIT - V

C++ Templates: Introduction, class templates, member function template, overloading template functions.

C++ Exception Handling: Try, throw, catch

Suggested Reading:

1. E. Balagurusamy **"**Object Oriented Programming with C++" , McGraw-Hill Education (India), 6 th Edition 2013
2. Bjarne Stroustrup "The C++ Programming Language", Pearson Education, 5th Edition (2013)
3. Robert Lafore **"**Object-Oriented Programming in C++ " Fourth Edition Sams Publishing,2002

EC 121

NETWORK THEORY
(ECE)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To provide concepts of Network/Circuit Theory and Theorems.
2. To provide the knowledge of A.C and D.C analysis of circuits.

Course Outcomes:

1. Student will be able to distinguish between circuit/network and analyze DC, AC circuits.
2. Student will be able to understand the transient analysis.
3. Student will be able to distinguish between Symmetrical/Asymmetrical networks and understanding the significance of two port parameters, magnetic coupled circuits.

UNIT-I

Basic Concepts of Electric Circuits: Lumped Circuit elements, dependent and independent sources, Ohm's law, Kirchoff's laws, network reduction techniques, nodal and mesh analysis, Source transformations, Star and Delta transformations, Thevenin's and Norton's theorems, Superposition theorem, Maximum power transfer theorem, Reciprocity theorem, Tellegen's theorem, Millman's Theorem,

Network Topology: Topological description of networks. Network graphs, tree, chord, cutset, incidence matrix, tieset matrix, cutset matrix. formulation of node and loop equations, duality, dual networks.

UNIT-II

Steady state Sinusoidal analysis: Steady state response of RLC networks to exponential signals, Sinusoidal signals, phasor and vector representations, impedance and admittance, applications of network theorems. Calculation of power in a.c. circuits: average power, apparent power, complex power.

Magnetic coupled circuits: Concept of self, mutual inductance, co-efficient of coupling, dot convention rules and analysis of simple circuits.

UNIT-III

Time domain analysis: steady state and transient analysis for basic RL, RC and RLC circuits in linear time invariant first order and second order circuits, Formulation of integro differential equations, Zero Input Response (ZIR), Zero State Response (ZSR), complete response.

Laplace transforms: Introduction to Laplace transforms and its applications to circuit analysis.

UNIT-IV

Frequency domain analysis: Concept of complex frequency, impedance and admittance functions, Pole-Zero cancellation, calculation of natural response from pole zero plot. Series and parallel resonance, Q-factor, selectivity, bandwidth

UNIT-V

Symmetrical and Asymmetrical networks: Characteristic impedance, propagation constants, image and iterative impedances for T, π, L, Bridged T and Lattice networks. Introduction to Attenuators and equalizers

Two port networks: Z, Y, h, g, ABCD and Inverse ABCD parameters, equivalence of two port networks. Inter connection of two port networks, ideal and practical transformer.

Text Books:

1. William H.Hayt, Jr.,Jck E. Kemmerly & Steven M.Durbin, Engg Circuit Analysis, 5th ed, McGraw Hill, 2010.
2. Van.valkenberg M.E Network analysis, PHI, Newdelhi, 3rd edition 2002.

Suggested Reading:

1. Charels A. Desoer nd Ernest S Kuth, Basic Circuit Theory, McGraw Hill, 2009.
2. Raymond A. DeCarlo and Penmin Lin, Linear Circuit Analysis, 3rd edition, Oxford Univ. Press, 2007.
3. Lawrence P. Huelsman, Basic Circuit Theory, 3rd edition, 2009.

ME 112

ENGINEERING GRAPHICS
(common to CSE, ECE, EEE and IT)

Instruction	1L + 3D Periods per week
Duration of Mid term Examination	90 minutes
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To provide an exposure in understanding the drawings during a multidisciplinary approach towards a problem
2. To train up in perception and imagination of a three dimensional scenario.

Learning Outcome :

The student should be able to

1. Understand different engineering curves
2. Interpret the principles of visualization in first angle orthographic projection for different objects.
3. Interpret and draw isometric projection of a single engineering component

UNIT-I

Scales: Instruments and their uses, reduced and enlarged scales, representative fraction, types of scales- plain, diagonal and vernier.
Simple Geometric Constructions: Construction of Regular polygons by different methods.
Conic Sections: ellipse, parabola and hyperbola by different methods.

UNIT-II

Projection Of Points And Straight Lines: Orthographic projection, projection of points placed in different quadrants. Projection of straight lines inclined to one and two reference planes.

UNIT-III

Projection of Planes: projection of perpendicular planes, oblique planes.

UNIT-IV

Projection of Solids: polyhedra, solids of revolution, projection of solids with axis inclined to one plane and parallel to another reference plane.

UNIT-V

Isometric Projections: isometric projections and views of prisms, pyramids, cones and cylinders, and combination of two or three solids.

Text Books:

1. N.D.Bhatt," Elementary Engineering Drawing", Charotar Publishers, 2012
2. BasanthAgrawal and C M Agrawal "Engineering Drawing 2ed ", McGraw-Hill Education (India) Pvt. Ltd.

Suggested Reading:

1. K.L.Narayana and P.K.Kannaiah, "Text Book of Engineering Drawing", Scitech Publications, 2011.
2. P.S.Gill' "Engineering Graphics", Kataria Publications, 2011.
3. K.Veenugopal, "Engineering Drawing and Graphics + Autocad", New Age International Pvt.Ltd, 2011.
4. Shaw M.B and Rana B.C., "Engineering drawing", Pearson, 2nd edition, 2009
5. P I Varghees, " Engineering Graphics ",Tata McGraw-Hill publications, 2013
6. Bhattacharya. B, "Engineering Graphics", I. K. International Pvt.Ltd, 2009
7. Dhawan R.K., "Principles of Engineering Graphics and Drawing", S. Chand 2011

EG 122

ENGLISH LANGUAGE LABORATORY – II
(common to all branches)

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	1

COMUR ASSISTED LANGUAGE LEARNING LAB (CALL)

Introduction:

The language lab focuses on the practice of connected speech and word stress. They are also introduced to the process of Listening.
The following are the **objectives** of the course:

1. To recognize and be familiar with word stress and identify stress patterns.
2. To develop awareness of rhythm and notion of stress time.
3. Listen effectively in a variety of situations for a variety of purposes, practice the behavior of effective , active listeners.
4. Assess strengths in listening and set goals for the future.

SYLLABUS:

1. Word stress: Primary stress, secondary stress, functional stress, rules of word stress.
2. Rhythm & Intonation: Introduction to Rhythm and Intonation. Major patterns, intonation of English with the semantic implications.
3. Aspects of connected speech: Strong forms, weak forms, contracted forms, elision.
4. Listening skills.

INTERACTIVE COMMUNICATION SKILLS LAB (ICS LAB)

Introduction:

The objective of the course is to introduce them to the art of making effective presentations. They also learn do debate, the interview process and interview skills.
The following are the **objectives** of the course:

1. To enable students to express themselves fluently and appropriately in social and professional contexts.
2. To provide techniques for preparing and delivering a presentation.
3. Practicing interview skills via an interpersonal encounter similar to real life situation.
4. To understand and communicate various forms of argument effectively, to develop the ability to analyze, evaluate, construct and refute arguments.

SYLLABUS:

1. Debate: Differences between a debate and a group discussion. Essentials of a debate, conducting a debate.
2. Presentation Skills: Making effective presentations, expressions which can be used in presentation, use of non-verbal communication, coping with stage fright , handling question and answer session; use of audio- visual aids , Power point presentations.
3. Interview skills: Planning and preparing for interviews, facing interviews confidently, use of suitable expressions during interview.

Suggested Reading:

1. E.Suresh kumar et al, **. English for Success** (with CD), Cambridge University Press India Pvt Ltd. 2010.
2. T Balasubramanian. **A Textbook of English Phonetics for Indian Students**, Macmillan, 2008.
3. J Sethi et al. **A Practical Course in English Pronunciation** (with CD), Prentice Hall India, 2005.
4. Edgar Thorpe. **Winning at Interviews**, Pearson Education, 2006
5. Priyadarshi Patnaik**. Group Discussions and Interviews,** Cambridge University Press Pvt Ltd 2011

PY 125

ENGINEERING PHYSICS LAB - II
(common to all branches except Bio-Tech)

Instruction	3 Periods per alternate week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

1. Planck's Constant – Determination of Planck's Constant using photo cell
2. Solar Cell – Study of I-V characteristics of given solar cell and calculation of fill factor, efficiency and series resistance
3. Hall Effect – Determination of Hall coefficient, carrier concentration & mobility of charge carriers of given semiconductor specimen
4. P-N Junction Diode – Study of V-I characteristics and calculation of resistance of given diode in forward and reverse bias
5. B-H Curve – Determination of hysteresis loss of given specimen
6. Dielectric Constant – Determination of dielectric constant of given PZT sample at phase transition temperature
7. Energy Gap – Determination of energy gap of given semiconductor
8. Thermistor – Determination of temperature coefficient of resistance of given thermistor
9. *e/m* of Electron by Thomson's Method
10. Thermoelectric Power – Determination of thermoelectric power of given sample

CY 123

ENGINEERING CHEMISTRY LAB - II
(common to all branches except Chemical and Bio-Tech)

Instruction	3 Periods per alternate week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives

1. To impart fundamental knowledge in handling the equipment/glassware and chemicals in the chemistry laboratory.
2. To offer hands on experience on the basic equipment related to engineering chemistry.
3. For practical understanding of theoretical concepts of chemistry

I. Volumetric Analysis:

1. Estimation of amount of copper ion using hypo solution.
2. To find out saponification number of oil.

II. Complexometry

3. Estimation of permanent and temporary hardness of water using EDTA solution.
4. Ore analysis – estimation of MnO_2 in pyrolusite.

III. Organic Preparations

9. Preparation of aspirin
10. Preparation of azodye

IV. Instrumental Chemical Analysis

i) Potentiometric Titrations

5. Strong acid vs strong base
6. Redox titration (estimation of Fe^{+2} using $KMnO_4$ solutions)

ii) pH metric titration

7. Strong acid vs strong base

iii) Polarimetry

8. Specific rotation of sucrose and inversion of sucrose.

Suggested Reading:

1. Vogel's text book of quantitative chemical analysis by J.Mendham & Thomas, Pearson education; Pvt.Ltd.new Delhi 6th ed.2002
2. Senior practical physical chemistry by BD Khosla, A.Ghulati, VC.Garg; R.Chand and CD; New Delhi 10th ed 2001.
3. Laboratory manual in engineering chemistry by S.K.Bhasin and Sudha Rani; Dhanpath Rai publishing company.

CS 122

PROGRAMMING LAB - II
(common for all branches)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

1. Program to implement function overloading
2. Program to implement function template
3. Program to implement types of constructors and destructor
4. Program to implement new and delete operators (Dynamic memory allocation).
5. Program to implement unary and binary operator overloading
6. Creation of inheritance hierarchy for graphic shapes.
7. Implementation of runtime polymorphism
8. Classes for Bank Account, Student information, Library catalog
9. Implementation of Streams.
10. Implementation of Template Classes.

EC 122

NETWORKS LAB
(ECE)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives

1. To provide practical study of passive elements and their measurement procedures.
2. To provide familiarity with CRO and soldering practices.
3. To provide the practice of A.C and D.C circuit analysis using network theorems.
4. To provide a practice on simulating software.

Course Outcomes

1. Student will be able to identify and measure circuit elements R, L, C.
2. Student will be able to work with CRO and Power sources.
3. Student will be able to conduct experiments on D.C and A.C circuits and also verify the network theorems.
4. Student will be able to simulate a circuit using the simulation software.

1. Study of RLC components, Bread board, Regulated power supply, Function generator, C.R.O.
2. Measurement of R, L, C components using LCR - Q Meter.
3. Soldering for simple circuits.
4. Verification of Ohm's law, KVL and KCL.
5. Verification of Superposition theorem and Tellegen's theorem.
6. Verification of Thevenin's and Norton's theorems.
7. Verification of Maximum power transfer theorem and Reciprocity theorem.
8. Verification of Transient Response in RC, RLcircuits for DC inputs
9. Design and Verification of Series Resonance.
10. Design and Verification of Parallel Resonance.
11. Measurement of two-port network parameters (Z,Y,h,T).
12. Design and Verification of Attenuators.

Note: Experiments are to be simulated by using any simulating software.

With effect from Academic Year 2014-15

Syllabus of B.E. II YEAR

OF

FOUR YEAR DEGREE COURSE

IN

ELECTRONICS & COMMUNICATON ENGINEERING

June 2014

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)

Hyderabad – 500 075

With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
ELECTRONICS & COMMUNICATON ENGINEERING

SEMESTER – I

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	MT 211	Fourier Analysis and Partial Differential Equations	4	-	3	75	25	3
2	EC 211	Electronic Devices	4	1	3	75	25	3
3	EC 212	Electromagnetic Theory and Transmission Lines	4	1	3	75	25	3
4	EC 213	Signals and Systems	4	1	3	75	25	3
5	EE 215	Electrical Technology	4	-	3	75	25	3
6	ME 217	Elements of Mechanical Engineering	4	-	3	75	25	3
PRACTICALS								
7	EC 216	Electronic Devices Lab	-	3	3	50	25	2
8	EE 217	Electrical Technology Lab	-	3	3	50	25	2
		Total	**24**	**9**	**-**	**550**	**200**	**22**

L: Lecture, T: Tutorial, D: Drawing, P: Practical

With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
SERVICE COURSES OFFERED TO OTHER DEPARTMENTS

SEMESTER – I

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 214	Electronic Engineering –I (For EEE)	4	-	3	75	25	3
2	EC 215	Basic Electronics (Common to CSE and IT)	4	-	3	75	25	3
PRACTICALS								
1	EC 217	Electronic Engineering –I Lab (For EEE)	-	3	3	50	25	2
2	EC 218	Basic Electronics Lab (Common to CSE and IT)	-	3	3	50	25	2

L: Lecture, T: Tutorial, D: Drawing, P: Practical

MT 211

FOURIER ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS

(Common to all branches except Biotech)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Ojectives:

1. Introduce the concepts of Fourier analysis & z-transforms in engineering applications.
2. Introduction of boundary value problems and their applications in Heat Transfer and wave propagation.

Course Outcomes:

1. Students must be able to apply mathematical concepts of Fourier series, Fourier Transforms in solving one dimensional wave equation, Heat equation and the two dimensional Laplace equations.

UNIT– I

Fourier series: Dirichlet's conditions - expansion of a given function in Fourier series. Expansion of even and odd functions in Fourier series. Change of interval, half range sine and cosine series. Complex form of Fourier series.

UNIT– II

Fourier Transforms: Fourier integral (statement only)-Fourier transform, Inverse Fourier transform, Fourier sine and cosine transform, definitions and properties.

UNIT– III

Partial differential equations:

Formation of Partial differential equations by elimination of arbitrary constants and by elimination of arbitrary functions. Partial differential equations of First Order- Lagrange's Linear equation and its solution. Partial differential equations of First order but of any degree-Standard types: I- $f(p,q)=0$, $II-f(z,p,q)=0$, III- $f(x,p)=f(y,q)$ and IV- $z=px+qy+f(p,q)$ General Method of solution: Two independent variables-Charpit's Method-three or more independent variables Jacobi's method.

UNIT– IV

Applications of Partial differential equations:

Solutions of Partial differential equations by the method of separation of variables- boundary value problems. One dimensional Wave equation, one dimensional Heat equation- related problems. Laplace equation.

UNIT – V

Z- Transforms: Introduction, Basic theory of Z-transforms. Z-transforms of some standard sequences, Existence of z-transform. Properties of z-transforms: Linearity, Translation, scaling properties. Initial and final value theorems. Differentiation of
Z-transforms, convolution theorem, Solution of difference equations using Z-transforms.

Text Books:

1. Kanti B Datta "Mathematical Methods of Science and Engineering (Aided with MATLAB)" CENGAGE Learning.
2. B.S.Grewal "Higher Engineering Mathematics", Khanna Publishers 42nd Edition.2013
3. M.D.Raisinghania , Text Book of ODE and PDE , S.Chand publishers 4th -2012

EC 211

ELECTRONIC DEVICES

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

To provide knowledge about different types of diodes, transistors and their applications to analyze circuit characteristics. In particular:

1. To introduce the fundamental concepts of semiconductor devices like PN junction Diodes, Transistors and special Diodes.
2. To understand the applications of diodes and their operation.
3. To understand the characteristics of Transistors –BJT, FET, MOSFET and analyze their behavior in terms of h-parameters. This is a foundation course for "Electronic Circuits"

Course Outcomes:

The student will be able to:

1. Understand the basics of PN junction diodes, transistors and their applications.
2. Analyze the characteristic behavior of BJT , FET ,& MOSFET
3. Learn how to bias the transistors for their application as amplifiers

UNIT – I

SEMICONDUCTOR DIODE CHARACTERISTICS: Qualitative theory of p-n junction, The p-n junction as a Diode, Current components in p-n diode, Qualitative theory of the p-n Diode currents, The Volt-ampere characteristic temperature dependence of p-n diode characteristics, Diode Resistance, Transition Capacitance, Diffusion Capacitance, p-n diode switching times, breakdown Mechanisms , Diode as a circuit element, small signal diode models, Zener Diodes, Zener voltage regulator and its limitation.

UNIT – II

DIODE APPLICATIONS: Half wave, Full wave and Bridge Rectifiers - their operation, performance characteristics, and analysis; Filters (L, C, LC and CLC filters) used in power supplies and their ripple factor calculations, design of Rectifiers with and without Filters.

UNIT – III

BIPOLAR JUNCTION TRANSISTOR: Construction and Operation of NPN and PNP transistor, current components and current flow in BJT, Modes of transistor operation, Early effect, BJT input and output characteristics in CB, CE CC configuration obtaining h-parameters from BJT characteristics, BJT biasing techniques, stability factors, Bias compensation techniques, Thermal runway, Thermal stability, BJT as an amplifier and as a Switch

UNIT – IV

SPECIAL SEMICONDUCTOR DEVICES: Elementary Treatment of SCR- UJT- Diac- Triac - Varactor diode - PIN diode - Tunnel diode - Principle of photo electronic devices - Photo diode and Photo transistor - LED, LCD, LASER diode.

CRO: Elementary discussion on principles of CRT - Deflection and focusing of electron beam in CRT, CRO and its Applications.

UNIT – V

FIELD EFFECT TRANSISTORS: The Junction Field Effect Transistor, The Pinch-off Voltage V_P, V-I characteristics of JFET. JFET biasing-zero current drift biasing, biasing of FET, FET as an amplifier and as a switch. MOSFETs: Enhancement & Depletion mode MOSFETs, V-I characteristics, MOSFET as resistance, Biasing of MOSFETs, MOSFET as a switch.

Text Books:

1. Millman and Halkias," Electronic devices and circuits", 2nd Edition, McGraw Hill Publication, 2007
2. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009

Suggested Reading:

1. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.
2. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6thEdition, Pearson Education, 2005.
3. Jacob Millman, Christos C. Halkias, "Integrated electronics: analog and digital circuits and systems", 2nd Ed, Mc Graw-Hill, 2010

EC 212

ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To explain the mathematical fundamentals necessary for understanding the electromagnetic theory
2. To teach the electrostatics and magnetic along with Maxwell's equations for EM Waves
3. To present the concepts of transmission lines, and this is a prerequisite course for "Antennas"

Course Outcomes: Students will be able to

1. Mathematically solve simple static Electromagnetic problems using various laws and theorems.
2. To understand the Electromagnetic wave properties with respect to different transmission mediums
3. To estimate the two wire transmission line properties

UNIT – I

Review of coordinate systems. Coulomb's Law, Electric field due to various Charge configurations and Electric flux density. Gauss's Law and its applications. Work, Potential and Energy, The dipole. Current and Current density, Laplace and Poisson's equations. Calculation of capacitance for simple configurations.

UNIT – II

Steady magnetic-Biot-Savart's law, Ampere's law. Stoke's theorem, Magnetic flux and magnetic flux density. Scalar and vector magnetic potentials.

Electric and Magnetic fields boundary conditions. Maxwell's equations for static and time varying fields.

UNIT – III

Uniform plane waves in free space and in conducting medium, Polarization. Instantaneous, average and complex Poynting thorem and its applications.

Reflection: Normal incidence on dielectrics and conducting medium.

Reflection: Oblique incidence on dielectrics and conducting medium,

UNIT – IV

Concept of symmetrical network-T and π networks. Types of Transmission Lines-Two wire lines. Primary and secondary constants. Transmission Line equations. Infinite line and characteristic impedance- Open and short circuit lines and their significance. Distortion less transmission line, Concept of loading of a transmission line, Campbell's formula.

UNIT – V

Impedance at any point on the transmission line- Input impedance. RF and UHF lines, transmission lines as circuit elements. Properties of λ/2, λ/4 and λ/8 Lines. Reflection and VSWR. Matching : Stub matching. Smith chart and its applications.

Text Books:

1. "Elements of Electromagnetics", Matthew N.O. Sadiku, 4th edition, 2008, Oxford University Press
2. "Engineering Electromagnetics", William H. Hayt Jr. and John A. Buck, 7th edition, 2006, TMH
3. "Networks Lines and Fields", John D. Ryder, 2nd edition, 1999, PHI

Suggested Reading:

1. "Electromagnetic Waves and Radiating Systems", E.C. Jordan and K.G. Balmain, 2nd edition.,2000, PHI
2. "Transmission Lines and Networks", Umesh Sinha, Satya Prakashan, 2001, (Tech. India Publications), New Delhi

EC 213

SIGNALS AND SYSTEMS

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
2. To teach Sampling theorem, describe the time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
3. To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems. This is a foundation course for "Communication Engineering".

Course Outcomes: Students will be able:

1. To mathematically represent and analyze the signals in time and frequency domains.
2. To understand the Sampling theorem and discrete time signal transformations techniques.
3. To evaluate convolution and correlation integrals and understand the signal comparison techniques and properties.

UNIT– I Continuous Time Signals (CTS): Introduction to signals, Elementary signals and other signals, their representations. Classifications of signals, introduction to systems and their classification. Orthogonality, approximation of a function by a set of mutually orthogonal functions, evaluation of mean square error.
Fourier series: Review of Fourier series, Exponential Fourier series. Existence and convergence. Relationship among various Fourier series representations. Symmetry conditions, amplitude and phase spectrums. Properties of Fourier series. Power Spectral Density (PSD).

UNIT – II Signal Representation By Continuous Exponentials: The direct and inverse Fourier transform. Existence and properties of Fourier Transform. Frequency spectrum. Fourier Transform of singularity functions and periodic signals. Energy Spectral Density (ESD). Filter characteristics of linear systems, distortion less system. Phase delay and group delay. Causality and physical realizability: The paley-weiner criterion.**UNIT – III Signal Representation By Generalized Exponentials:** The Bilateral and unilateral Laplace transforms. Region of convergence and it properties. Properties of Laplace transform. Inverse Laplace transform, Laplace transform of periodic signals. LTI system: Impulse response, System transfer function. Stability and Causality.

UNIT – IV Discrete Time Signals (DTS): Sampling of continuous time signals. DTS representation, Discrete Time Fourier Series (DTFS) and properties. Discrete Time Fourier Transform (DTFT) and properties.

Z–Transform: The Direct Z-Transform, Region of convergence and its properties. S–Plane and Z–Plane correspondence, Z–Transform properties. Inverse Z–Transform, Discrete LTI system: impulse response and system transfer function, Stability and Causality.

UNIT – V Convolution: Continuous convolution: Graphical interpretation and Convolution properties. Discrete convolution: Graphical interpretation and Convolution properties.

Correlation: Continuous correlation: Cross correlation and Auto correlation, their graphical interpretation and properties. Discrete correlation: Cross correlation and Auto correlation, their graphical interpretation and properties. Relation between convolution and correlation integrals.

Text Books:

1. B.P.Lathi, "Signals, Systems and Communications", BS Publications, 2008
2. A.V. Openheim, A.L.S. Willsky, I.T. Young, "Signals and Systems", Prentice Hall, India, 2nd edition, 2009
3. M.J. Robert " Fundamentals of signals and systems", McGraw Hill, 2008

Suggested Reading:

1. P. Rama Krishna Rao, "Signals and Systems", McGraw Hill, 2008
2. Simon Haykin, "Signals and Systems," Wiley India
3. Narayana Iyer, Cengage learning, "Signals and Systems", First Impression 2011

EE 215

ELECTRICAL TECHNOLOGY
(ECE)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To know the fundamentals of DC & AC machines.
2. To understand the concepts of power systems.

Course Outcomes:

The student will be able to:

1. Distinguish between DC machines & AC machines in respect of concepts, control and applications
2. Identify the various sources of generation of electricity and its transmission technologies.

UNIT – I

D.C. Generators: Constructional details, Simple lap & wave windings, Methods of excitation, Induced EMF, Basic ideas of armature reaction and commutation, Characteristics of shunt, series and compound generators and their applications.

DC Motors: Significance of back EMF, Torque developed in motors, three point starter, Characteristics of shunt, series and compound motors, Speed control of DC motors.

UNIT – II

Poly Phase System: Advantages of three phase system, Star and delta connections, Relationship between line and phase quantities, Measurement of power by Two Wattmeter method.

A.C. Generators: Construction, EMF equation, Armature reaction, Synchronous impedance, Regulation.

UNIT – III

Transformers: Single Phase transformer, Construction, Working principle, EMF equation, Ideal transformer, Phasor diagram under no load and loaded conditions, OC and SC tests on transformer, Efficiency and regulation, Working principle of auto transformer.

UNIT – IV

Induction Motors: Construction, Production of rotating magnetic field, Slip, Slip-torque characteristics, starting methods of Induction motors.

Single Phase Induction Motors: Construction, Theory of operation, Characteristics of shaded pole, Split phase and capacitor motors, Applications.

UNIT – V

Power Systems: Basic ideas of thermal, hydro, nuclear and non-conventional generating systems and layout, Block diagram of power systems, Transmission using high voltages, Advantages, Basic idea of line parameters of short lines.

Text Books:

1. H. Cotton, Electrical Technology, BI Publications
2. V.K.Mehta, Principles of Electrical Engineering, S.Chand & Co.
3. M.L. Soni, PV Gupta and VS Bhatnagar, A course in Electrical Power, Dhanpat Rai and Sons

Suggested Reading:

1. P.V. Prasad & S. Siva Nagaraju, Electrical Engineering: Concepts & Applications, Cengage Learning.
2. B.L.Theraja, Electrical Technology Vol.I & Vol.II, S.Chand & Co.
3. M.S.Naidu and Kamakshiah – Electrical Technology –TMH Publications.

ME 217

ELEMENTS OF MECHANICAL ENGINEERING
(ECE)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: Students will acquire basic knowledge in

1. Thermodynamics and its applications.
2. Basic manufacturing processes.
3. Mechanism of various power transmitting devices.

Course Outcomes: Students can

1. Understand the working principles of I.C. engines, refrigerators, reciprocating air compressors.
2. Estimate power transmitted by belts, gear trains and is exposed to various manufacturing processes.

UNIT – I Thermodynamics: Macroscopic & microscopic approaches, concepts of thermodynamic systems, processes, cycles and properties, quasi-static process, Zeroth law, first law of thermodynamics, application of first law to various thermodynamic processes & SFEE. Second law of thermodynamics - Kelvin–Planck & Clausius Statements. PMM1, PMM2.

I.C Engines: Working of four– stroke and two–stroke petrol and diesel engine with p–V diagrams, valve timing diagram, calculation of indicated power, brake power, specific fuel consumption, mechanical and thermal efficiencies.

Reciprocating Air Compressors: Uses of compressed air, principle of working and work done of single stage compressor–without & with clearance, multistage compressors, advantages, intercooler & aftercooler.

UNIT – II Heat Transfer: Basic modes of heat transfer, Fourier's law of conduction, Newton's law of cooling, Stefan–Boltzmann law of radiation, one–dimensional steady state conduction heat transfer through plane walls without heat generation and with constant thermal conductivity.

Heat Exchangers: Classification and application of heat exchangers in industry, derivation of LMTD in parallel and counter flow heat exchangers and problems on LMTD.

UNIT – III Refrigeration: Types of refrigeration systems–air refrigeration system using Bell–Coleman cycle. Simple vapor compression system, COP, T-s & p–h diagrams, types and properties of refrigerants, eco-friendly refrigerants., introduction to psychrometry, psychrometric processes, simple problems using psychrometric chart.

UNIT – IV Basic Manufacturing Processes: Welding, brazing and soldering, brief description of process and associated principles, arc welding & gas welding.
Casting: Sand casting, die casting and principles, application.
Forming: Description of forging, extrusion, drawing & rolling.
Principles and Applications of Basic Machining Process: Turning, milling, drilling and grinding.

UNIT – V Definition of kinematic link, pair, mechanism and machine.
Gears: Classifications of gears, nomenclature
Gear Trains: Simple, compound, inverted and epi–cyclic gear trains.
Belt Drives: Open and cross belt drives, length of belt, ratio of tensions for flat belt, condition for maximum power transmission for flat belt.

Text Books:

1. R.K.Rajput, Thermal Engineering, Laxmi Publications (P) Ltd, 8th edition, 201.
2. P.C.Sarma, A Text book of Production Technology, S. Chand & Company Ltd., 2008
3. Thomas Bevan, Theory of machines, CBS Publishers, 2010

Suggested Reading:

1. Mahesh M Rathor, Thermal Engineering, Tata McGraw Hill Publishers, 2013
2. R.K. Jain, Production Technology, Khanna Publishers, 2010
3. S.S.Ratan, Theory of machines, Tata McGraw Hill Publishers, 2008

EC 216

ELECTRONIC DEVICES LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

To develop an understanding of the underlying concepts of Electronic devices and circuits with special emphasis on the following concepts:

1. Fundamental concepts of semiconductor diodes and transistors.
2. Applications of various diodes.
3. V-I Characteristics of special devices.
4. Transistor circuit behavior and their characteristics.

Course Outcomes: The student will be able to:

1. Verify the working of PN Junction diodes, transistors and their characteristic behavior.
2. Learn design of different rectifiers with various filter combinations.
3. Set up bias point in a transistor.
4. Build an amplifier and find the frequency response of amplifier.

List of Experiments:

1. CRO Applications.
2. V-I Characteristics of Silicon and Germanium diodes and measurement of static and dynamic resistances.
3. Zener diode characteristics and its application as voltage regulator
4. Design, realization and performance evaluation of half wave rectifiers without filters and with C &π section filters
5. Design, realization and performance evaluation of full wave rectifiers without filters and with C &π section filters
6. Plotting the characteristics of BJT in Common Base configuration and measurement of h-parameters.
7. Plotting the characteristics of BJT in Common Emitter configuration and measurement of h-parameters.
8. Plotting the characteristics of JFET in CS configurations and measurement of Transconductance and Drain resistance.
9. BJT biasing circuits.
10. FET biasing circuits.
11. Common Emitter BJT Amplifier and measurement of Gain, bandwidth, input and output impedances.
12. Common Source FET Amplifier and measurement of Gain, bandwidth, input and output impedances.

13. Emitter Follower / Source Follower circuits and measurement of Gain, bandwidth, input and output impedance.
14. Characteristics of special semi-conductor devices-UJT and SCR.
15. Characteristics of Tunnel diode and photo diode.

Suggested Reading:

1. Robert Diffenderfer, "Electronic Devices Systems and Applications", Cengage Learning India Private Limited, 2010
2. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH 2001

Special Note:

1. Wherever possible, Analysis and design of circuits should be carried out using SPICE tools.
2. Five marks are allocated to SPICE design and analysis and the remaining 20 marks are for other internal lab assessments.

General Note:

1. The experiments should be performed on bread board using discrete components.
2. There should not be more than 2 students per batch while performing any of the lab experiment.
3. A minimum of 12 experiments should be performed.
4. Mini project of 10 marks.

EE 217

ELECTRICAL TECHNOLOGY LAB
(ECE)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To comprehend various characteristics of DC machines.
2. To understand the characteristics of different AC machines.
3. To become familiar with the operation of various electrical apparatus.

Course Outcomes: The student will be able to

1. Know the right instrument and its usage for the given circuit.
2. Identify the suitable machine for required application.

List of Experiments:

1. Magnetization curve of a separately excited DC generator
2. Load characteristics of a shunt generator
3. Load characteristics of a series generator
4. Performance characteristics of a DC shunt motor
5. Load characteristics of a DC series motor
6. Performance characteristics of a compound motor
7. Speed control of DC shunt motor
8. O.C. and S.C. tests on single phase transformer
9. Load test on single phase transformer
10. Performance characteristics of a three phase induction motor
11. Speed control methods of induction motor
12. Regulation of alternator by O.C. and S.C. tests
13. Measurement of three-phase power by two wattmeter method

Note: At least **10** Experiments should be conducted in the semester

EC 214

ELECTRONIC ENGINEERING-I
(For EEE)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:
The aim of this course is to:

1. To introduce the fundamental concepts of semiconductor devices.
2. To understand the operation of different types of electronic devices and their corresponding applications.
3. To provide a conceptual foundation on amplifiers that can be used as a basis for further study.

Course Outcomes:
From this course student will be able to:

1. Demonstrate a systematic and critical understanding of the theories and principles of electronic devices.
2. Analyze the circuit behavior for various required characteristics.
3. Creatively apply the concepts behind various semi-conductor devices in their mini projects.

UNIT-I
Semiconductor diodes and Rectifiers: p-n junction diode: V-I characteristics, temperature dependence of V-I characteristics; Breakdown of junctions-Zener and Avalanche; Half wave, fullwave, bridge rectifiers, L, C, pi-section filters; Regulation and Ripple characteristics.

UNIT-II
Bipolar Junction Transistor: Current components; CE, CB, CC Configurations, characteristics; Transistor as an amplifier, operating point, bias stabilization circuits.

UNIT-III
Field Effect Transistors: V-I characteristics of JFET and MOSFET; Depletion and Enhancement modes, Biasing of JFET's and MOSFET's: Self-bias, biasing for zero current drift, biasing against device variations, biasing the enhancement MOSFET.

UNIT-IV
Low frequency amplifier Circuits: Small signal low frequency analysis of amplifier in 3 configurations using BJT and FET, Frequency response- effect of C_E/C_S and C_C on frequency response, Miller's theorem.

UNIT-V

CRO: Constructional details of CRO and its applications.

Special devices: Elementary treatment on the functioning of Tunnel/Backward diode, Varactor diode, Photo diode, Light Emitting diode. Liquid Crystal Display, Working of UJT, photo transistor.

Text Books:

1. Jacob Millman and Christos C. Halkias, Electronic Devices and Circuits, McGraw Hill, 3rd Edition, 2010.
2. Jacob Millman and Christos C. Halkias, Integrated Electronics, McGraw Hill, 1991.

Suggested Reading:

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI, 10th edition, 2006.
2. David Bell, “Fundamentals of Electronic Devices and Circuits”, 5th edition, Oxford University press, 2008.
3. Beng Streetman and Sanjay Banerjee, “Solid state electronic devices” 6th edition, Pearson education, 2005.

EC 215

BASIC ELECTRONICS
(Common for CSE, IT, MECH, PROD)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the knowledge of basic semiconductor devices and create foundation for forthcoming circuit design courses
2. To understand various applications like amplifiers, oscillators and op-amps also motivate and train students in logic design.
3. To understand the working principle of the transducers and aware the students about the advances in Instrumentation.

Course Outcomes:

1. Ability to understand the usefulness of semiconductor devices in circuit making like rectifiers, filters, regulators etc.
2. Ability to develop new directions in logic design to analyze, design and implement combinational circuits.
3. Ability to analyze the principles and practices for instrument design to development the real world Problems.

UNIT – I

Semiconductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current, Hall effect, Law of mass action, Characteristics of P-N Junction diode, current equation, Parameters and Applications.
Rectifiers: Half wave and Full wave Rectifiers Bridge and center tapped with and without filters, Ripple factor, regulation and efficiency.

UNIT – II

Transistors: Bipolar and field effect transistors with their h-parameter equivalent circuits, Basic Amplifiers classification and their circuits (Qualitative treatment only).
Regulators and Inverters: Zener Diode**,** Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator.

UNIT-III

Feedback Amplifiers: Properties of Negative Feedback Amplifier, Types of Negative Feedback, Effect of negative feedback on Input impedance and Output impedance, Applications (Qualitative treatment only).

Oscillators: principle of oscillations, LC Type-Hartley, Colpitt and RC Type- Phase shift, Wien Bridge and Crystal Oscillator (Qualitative treatment only).

UNIT – IV

Operational Amplifiers: Basic Principle, Ideal and practical Characteristics and Applications-Summer, Integrator, Differentiator, Instrumentation Amplifier.
Digital System: Review of basic gates, Universal gates, Demorgan's theorem, minimization with Karnaugh Map up to three variables and realization of half, Full Adder and half, Full Sub tractors.

UNIT – V

Data Acquisition systems: Study of transducers-LVDT, Strain gauge.
Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics and their applications only.
Display Systems: Constructional details of C.R.O and Applications.

Text Books:

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson Education, 9TH edition, LPE, Reprinted, 2006.
2. Morris Mano, "Digital Design", Pearson Education, Asia 2002.

Suggested Reading:

1. Jacob Millman and C., Halkias, "Electronic Devices", McGraw Hill, Eight Edition, Reprinted, 1985.
2. Ramakanth A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Prentice Hall of India, 3rd edition,1985
3. W. D. Cooper, A. Helfric, "Electronic Instrumentation and Measurement Techniques", PHI, 4th edition.
4. S. Shalivahan, N. Suresh Kumar, A Vallavea Raj, "Electronic Devices and Circuits", Tata McGraw Hill, 2003

EC 217

ELECTRONIC ENGINEERING LAB - I

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. Fundamental concepts of semiconductor diodes and transistors.
2. Applications of various semi-conductor devices.
3. V-I Characteristics of special devices.
4. Transistor circuit behavior and their characteristics.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Learn the overview of principles and operation of various electronic components and equipment.
2. Verify the working of PN Junction diodes, transistors and their characteristic behavior.
3. Build an amplifier and find its voltage gain

List of Experiments:

1. Study of RLC components, Bread board, Regulated power supply, Function generator
2. Measurement of phase, frequency and sensitivity with CRO
3. V-I characteristics of semiconductor diodes (Germanium, Silicon and Zener)
4. Static Characteristics of BJT (CE)
5. Static Characteristics of BJT (CB)
6. Static Characteristics of FET (CS)
7. Design of Half wave and Full wave Rectifier with and without filters
8. Design of rectifiers with C, L, LC & Pi-filters
9. Static characteristics of SCR
10. Static characteristics of UJT
11. Biasing of BJT and FET
12. Emitter Follower
13. Source Follower
14. Frequency Response of CE amplifier
15. Frequency Response of CS amplifier

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text-Lab Manual", 7th Edition, TMH, 1994.
2. S. Poorna Chandra, B. Sasikala, "Electronics Laboratory Primer- A design approach", Wheeler Publishing, 1998.

General Note:

1. There should not be more than 2 students per batch while performing any of that lab experiment.
2. Mini project cum design exercise:
   a. The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.
   b. This exercise carries Sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercise.

C 218

BASIC ELECTRONICS LAB
(Common for CSE, IT, MECH, PROD)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices.
3. To study simple electronic circuits.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Understand the knowledge regarding electronic components and equipment.
2. Design various rectifiers and filters .Analysis of characteristic behavior of BJT , FET
3. Design of an amplifier
4. Verify the operation of Op-amp for various applications.

List of Experiments:

1. Study of Electronic components.
2. Characteristics of Semiconductor diodes (Germanium, Silicon and Zener).
3. CRO and its Applications.
4. Half, Full wave rectifiers with and without filters.
5. Voltage Regulator using Zener diode.
6. Characteristics of BJT in CE Configuration.
7. Characteristics of FET in CS Configuration.
8. Amplifier with and without feedback.
9. RC Phase shift oscillator
10. Operational Amplifier and its applications.
11. Verification of Logic gates
12. Realization of Half and Full adder

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH, 1994.
2. Paul B. Zbar," Industrial Electronics, A Text - Lab Manual", 3rd Edition

With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
ELECTRONICS & COMMUNICATON ENGINEERING

SEMESTER – II

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	MT 224	Complex Analysis and Random Processes	4	-	3	75	25	3
2	EC 221	Analog Electronic Circuits	4	1	3	75	25	3
3	EC 222	Analog Communication	4	1	3	75	25	3
4	EC 223	Pulse Digital and Switching Circuits	4	1	3	75	25	3
5	EC 224	Antennas and Wave Propagation	4	-	3	75	25	3
6	MB 214	Managerial Economics and Accountancy	4	-	3	75	25	3
PRACTICALS								
7	EC 226	Analog Electronic Circuits Lab	-	3	3	50	25	2
8	EC 227	Analog Communication Lab	-	3	3	50	25	2
9	EG 221	Soft Skills and Employability Enhancement	-	2	3	50	25	1
Total			**24**	**11**	**-**	**600**	**225**	**23**

L: Lecture, T: Tutorial, D: Drawing, P: Practical

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. II YEAR
SERVICE COURSES OFFERED TO OTHER DEPARTMENTS

SEMESTER – II

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 225	Electronic Engineering –II (For EEE)	4	-	3	75	25	3
2	EC 215	Basic Electronics (Common to Mech. and Prod.)	4	-	3	75	25	3
PRACTICALS								
1	EC 228	Electronic Engineering –II Lab (For EEE)	-	3	3	50	25	2
2	EC 218	Basic Electronics Lab (Common to Mech. and Prod.)	-	3	3	50	25	2

L: Lecture, T: Tutorial, D: Drawing, P: Practical

MT 222

COMPLEX ANALYSIS AND RANDOM PROCESSES

Instruction:	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

1. To develop the logical basis of probability theory
2. To develop skills necessary to solve practical problems in Complex Variables and its applications.
3. To develop the ability of analyzing the random signal

Course outcomes:

1. An ability to characterize probability models by employing counting methods and basic Probability mass function and probability density function canonical models for discrete and Continuous random variables.
2. An ability Characterize stochastic processes with an emphasis on stationary random processes.
3. An ability to characterize functions of random variables.

UNIT- I: Complex Variables:

Analytic function, Cauchy Riemann equations (Cartesian and polar forms) - construction of Analytic functions. Harmonic function, derivatives of Analytic functions.
Complex line integrals, Cauchy's Integral theorem, Cauchy's Integral formula and its derivatives and problems related to the above theorems.

UNIT-II: Taylor's and Laurent's Theorems (Only statement of the theorems)
Expansions-zeros, types of singularities and residues. Cauchy's Residue
theorem. Evaluation of real definite integrals by Cauchy's residue theorem.

UNIT-III: Probability & Random variables: Basic probability, addition and multiplication theorems. Conditional Probability and Bayes' Theorem. Discrete random variable and continuous random variable, probability mass function and probability density function, Mathematical expectation, properties of expatiations, variance, co-variance moments and moment generating function and characteristic function.

UNIT-IV: Probability distributions:

Discrete and continuous- probability distribution. Binomial distribution, Poisson distribution, Gaussian distribution, Rectangular/ uniform distribution, Normal distribution, Raylay distribution and erlong or negative exponential distribution.

UNIT-V: Random Process: Two Dimensional random variables, Joint probability density function, Cumulative Distribution function, Marginal probability distribution, conditional probability distribution, correlation.
Introduction to Random process, Classification of random processes, Average Values of Random processes, stationary, Analytical Representation of a Random Process ,Auto correlation function and its properties ,Cross Correlation Function and properties ,Ergodicity.

Text Books:

1. "Higher Engineering Mathematics", by Dr. B.S.Grewal, Khanna Publications, 43rd Edition-2014
2. "Functions of complex variables", by J N Sharma, Krishna Publications Ltd.50th Edition-2014.
3. "Probability, Statistics and Random Process" by T.Veerarajan
   (Tata Mc Graw Hill company Pvt. Ltd. Third Edition-2010)
4. "Probability Theory and Random Processes" by P.Ramesh Babu
   Tata McGraw Hill Education Private Limited First Edition-2014

EC 221

ANALOG ELECTRONIC CIRCUITS

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

To understand in detail about circuit analysis for various stages of transistor under amplification operations and stability considerations. In particular:

1. The concepts of high frequency equivalent transistor circuits like BJT, FET, and frequency response of single stage and multi stage amplifiers.
2. The fundamental concepts of positive and negative feedback and their applications.
3. The concepts of large signal amplifiers and radio frequency amplifiers.

Course Outcomes: The students will be able to:

1. Analyze and design various amplifier circuits.
2. Explain about feedback concepts and their importance in the amplifier circuits.
3. Design power amplifier and RF amplifiers and their stability considerations.

UNIT – I

Small Signal Single Stage Amplifiers: Low frequency and high frequency equivalent circuits – BJT & FET, Millers Theorem. Analysis of transistor amplifier circuit using h-parameters in various configurations - their comparison. Low frequency Common Source and Common Drain Amplifiers. High frequency Analysis of BJT and FET. Amplifier Frequency response, Multistage amplifiers: low frequency and High frequency Analysis of RC coupled , Transformer coupled and Direct coupled amplifiers with BJT and FET. Cascode amplifier, Darlington emitter follower – Bootstrap amplifier.

UNIT – II

Feed Back Amplifiers: The feedback concept, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, Voltage and current, series and shunt feedbacks. Stability considerations, Local versus global feedback.

UNIT – III

Oscillators: Positive feedback and conditions for sinusoidal oscillations, RC oscillator, LC oscillator, Crystal oscillator, Amplitude and frequency stability of oscillator.

Regulators: Transistorized series and shunt regulators.

UNIT – IV

Large Signal Amplifiers: BJT as large signal audio amplifiers, Classes of operation, Harmonic distortion, power dissipation, efficiency calculations. Design considerations of transformer coupled and transformer less push-pull audio power amplifiers under Class-A. Class-B, Class D and Class-AB operations, Heat Sinks

UNIT – V

Tuned Amplifiers: General consideration, Analysis and design of single tuned, inductively coupled and double tuned types with BIT, selectivity, gain & bandwidth comparison of multistage single tuned and double tuned amplifiers, the problem of stability in RF amplifiers, Neutralization & unilaterisation staggered tuned amplifiers. Class B and Class c tuned amplifiers.

Text Books:

1. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, McGraw Hill Publication, 2009
2. Donald Schilling, Charles Belove, TuviaApelewicz Raymond Saccardi, "Electronic Circuits: Discrete and Integrated", TMH, 3rd Edition

Suggested Reading:

1. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008
2. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 6th Edition, PHI, 1998
3. Ben G Streetman and Sanjay Banerjee, "Solid State Electronic Devices", 6th Edition, Pearson Education, 2005
4. Roody and Coolen, "Electronic Communications", 4th Edition, Pearson Education, Reprint 2007

EC 222

ANALOG COMMUNICATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: To understand

1. The concept of modulation and also to analyze continuous / pulse modulation schemes.
2. The design procedure of AM and FM transmitters and receivers.
3. The concept of noise and its effect on modulation schemes and also to estimate the figure of merit.

Course Outcomes: The student will be able to

1. Analyze the performance of both analog and pulse analog modulation schemes.
2. Design various AM, FM transmitters and receivers and can study the characteristics of them.
3. Interpret the effect of various noise sources on the communication system and to analyze the SNR calculations.

UNIT – I

Linear Modulation schemes: Need for modulation, double side band suppressed carrier (DSB-SC) modulation, conventional Amplitude Modulation (AM). Hilbert transform, properties of Hilbert transform. Single side band (SSB) modulation and Vestigial-side band (VSB) modulation. Modulation and demodulation of modulation schemes: AM, DSB-SC, SSB and VSB.

UNIT – II

Angle modulation schemes: Frequency Modulation (FM) and Phase modulation (PM), Concept of instantaneous phase and frequency. Types of FM modulation: Narrow band FM and wide band FM. FM spectrum in terms of Bessel functions. Direct and indirect (Armstrong's) methods of FM generation. Foster–Seeley discriminator and Ratio detector for FM demodulation. Introduction to PLL.

UNIT – III

Transmitters and Receivers: Classification of transmitters. High level and low level AM transmitters.FM transmitters. Principle and operation of Tuned radio frequency (TRF) and Super Heterodyne receivers. Selection of RF amplifier. Choice of Intermediate frequency. Image frequency and its rejection ratio, Receiver characteristics: sensitivity, selectivity, fidelity, Double spotting, Tracking and alignment, Automatic Gain Control.

UNIT – IV

Noise Sources - External Noise: Atmospheric noise and Industrial noise, Internal Noise: Transit time noise, Flicker noise, Partition noise, Shot noise and Thermal noise. Noise temperature. Noise in two-port network: noise figure, equivalent noise temperature and noise bandwidth. Noise figure and equivalent noise temperature for cascaded stages. S/N ratio and Figure of merit calculations for AM, DSB-SC, SSB and FM systems. Pre-emphasis and De-emphasis.

UNIT – V

Pulse analog modulation schemes: Sampling of continuous time signals. Sampling of low pass and band pass signals. Types of sampling. Pulse Amplitude Modulation (PAM) generation and detection. Pulse time modulation schemes: PWM and PPM generation and detection.

Text Books:

1. Simon Haykin, "Communication Systems," 4th Edition, Wiley India, 2011
2. Herbert Taub, Donald L. Shilling & Goutam Saha, "Principles of Communication Systems," 3rd Edition, TMH, 2008
3. Singh, R.P. and Sapre, S.D., "Communication Systems," TMH, 2007

Suggested Reading:

1. P. Ramakrishna Rao, "Analog Communication", 1st Edition, TMH, 2011
2. F.E.Termann, "Radio Engineering", 3rd Edition, TMH, 1947

EC 223

PULSE DIGITAL AND SWITCHING CIRCUITS

Instruction	4L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To Study the concepts of wave shaping using linear and non-linear circuits.
2. To study switching characteristics of Diode and design of Multivibrators
3. To learn various techniques for logic circuit reduction.
4. To understand the concepts of various combinational and sequential circuits.

Course Outcomes: The student will be able to

1. Construct different linear networks and find their response to different signals.
2. Understand switching characteristics of diodes.
3. Construct various multivibrators.
4. Design various combinational and sequential circuits

UNIT – I

Wave- Shaping: RC, RL and RLC circuits, response to Step, Pulse, Square wave inputs. Integrating and differentiating circuits, Compensated attenuators. Non-linear wave shaping using Diodes and Transistors. Clipping and Clamping circuits, Clamping circuit theorem.

UNIT – II

Multivibrators: Analysis and design of Transistor Multivibrators – Bistable, Monostable and Astable circuits. Operation of regenerative comparator (Schmitt Trigger). Bootstrap and Miller circuits, Time base generators, speed, transmission and displacement errors.

UNIT – III

Boolean – Algebra: Introduction to Boolean algebra, Demorgan's theorems, Canonical forms and Standard forms, Simplification of switching function using theorems, Introduction to Logic Gates, Ex-OR, Ex-NOR operations. Minimization of Switching Functions: Karnaugh map method, QuineMcCluskey tabular method. Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT – IV

Combinational Logic Design: Binary Adders, Subtractors, Code converters, Decoders and Encoders, Priority Encoder, Multiplexers and Demultiplexers. Static and hazard free design.

Introduction to Sequential Logic: Types of Flip-Flops, Excitation tables and Flip-Flop Conversions. Hold and setup times. Classification of sequential circuits.

UNIT – V

Sequential Logic Design: State diagram and State Table, Shift registers and counters, Design of synchronous and asynchronous counters. Introduction to ASM. Finite State Machines: Moore Type and Mealy Type FSM, Design of sequence Detector using Moore and Mealy FSM, One Hot Encoding.

Text Books:

1. Jacob Millman and HerbertTaub, "Pulse Digital and Switching Waveforms",TMH,3rd Edition 2011.
2. M. Morris Mano and Michael D. Ciletti, "Digital Design", 4th Edition., Prentice Hall, 2007
3. Zvi Kohavi, "Switching and Finite Automata Theory", TMH 2nd Edition, 2001.

Suggested Reading:

1. Ronald J. Tocci and Neal S. Widmer, "Digital systems principles and applications", 8th Edition, Pearson education, 2005
2. David A Bell, Solid state Pulse Circuits, 4th Edition, PHI 2009.
3. William I. Fletcher, "An engineering approach to digital design", Prentice Hall; 1st edition 1979.

EC 223

ANTENNAS AND WAVE PROPAGATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To explain the basic principles of antenna and its parameters for characterizing its performance.
2. To introduce concepts of various types of antennas, arrays for customizing the pattern parameters.
3. To present the propagation behavior of the radio wave in both troposphere and ionosphere.

Course Outcomes: Students will be capable of:

1. Estimating the basic antenna parameters using the antenna concepts.
2. Designing simple antenna with a specified radiation pattern characteristics.
3. Predicting the propagation behavior of radio wave in the atmosphere.

UNIT – I

Principles of radiation, retarded potential and isotropic radiator, Basic antenna parameters: Radiation patterns, radiation intensity, far field, near field, Gain and directivity, Antenna Polarization, effective aperture area and efficiency .Point sources, Current distribution, infinitesimal dipole.

UNIT – II

Half-wave dipole, quarter wave monopole, Effect of earth on vertical patterns, Loop antenna, Far field pattern of circular loop with uniform current.

Qualitative treatment of Helical Antennas: Axial mode pattern, wideband characteristics, radiation efficiency, Q, Bandwidth, S/N ratio.

UNIT – III

Arrays of point sources, two element array with equal and unequal amplitudes, different phases. Linear array with uniform distribution. Broadside and End fire arrays. Principle of pattern multiplication. Effect of inter element phase shift on beam scanning. Introduction to non-uniform linear arrays.

UNIT– IV

VHF, UHF Rhombic Antenna, Yagi - Uda Array, Design of Horn antenna, Parabolic Reflector and Cassegrain feed, Lens antennas. Microstrip antennas: different types, advantages and disadvantages of Microstrip antennas, Design of rectangular Microstrip antennas.

Antenna Measurements: Antenna Test Site, impedance, radiation pattern and gain measurement techniques, Antenna temperature.

UNIT – V

Ground wave propagation, Space and Surface waves, Tropospheric refraction and reflection, Duct propagation, Sky wave propagation: Critical frequency, Maximum Usable Frequency (MUF) and Skip distance, Regular and irregular variations in ionosphere. Friis transmission formula, Line of sight propagation.

Text Books:

1. Constantine A. Balanis, "Antenna Theory: Analysis and Design," 3rd Edition, John Wiley, 2005
2. John D. Krauss, Ronald J. Marhefka & Ahmad S. Khan, "Antennas and Wave Propagation," 4th Edition, TMH, 2010
3. Edward C. Jordan and Kenneth G. Balmain, "Electromagnetic Waves and Radiating Systems," 2nd Edition, PHI, 2001

Suggested Readings:

1. Chatterjee, R., "Antenna Theory and Practice", New Age Publishers, 2008.

MB 214

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: The objective of the course is to provide the analytical tools and managerial insights that are essential for the solution of those business problems that have significant consequences for the firm and society.

UNIT – I

Introduction to Managerial Economics: Introduction to Economics and its evolution - Managerial Economics - its scope, importance, Its usefulness to engineers - Basic concepts of Managerial economics.

UNIT – II

Demands Analysis: Demands Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Markets Competitive structures, price-output determination under perfect competition and Monopoly. (Theory questions and small numerical problems can be asked).

UNIT – III

Production and Cost Analysis: Theory of Production - Firm and Industry - Production function - input-out relations - laws of returns - internal and external economies of scale. Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs - out of pocket costs and imputed costs - Opportunity cost - Cost output relationship - Break-even analysis. (Theory and problems)

UNIT– IV

Capital Management: Capital Management, its significance, determinants and estimation of fixed and working capital requirements, sources of capital - Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.

(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT – V

Accountancy: Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement).

Text Books:

1. Mehta P.L., Managerial Economics – Analysis, Problems and Cases, Sulthan Chand & Son's Educational Publishers, 2011
2. Maheswari S.N Introduction to Accountanc, Vikas Publishing House, 2005
3. Panday I.M. Financial Management, Vikas Publishing House, 2009

Suggested Reading:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2001
2. M Kasi Reddy and S Saraswathi, Managerial Economics and Financial Accounting, PHI, 2007
3. J C Pappas and EF Brigham, Managerial Economics

EC 226

ANALOG ELECTRONIC CIRCUITS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives: To develop an understanding of the underlying concepts of analog electronic circuits with special emphasis on the following concepts

1. Pulse and digital circuits and their applications
2. Frequency response of single stage and multistage amplifiers
3. Positive and negative feedback amplifiers and their applications
4. Symmetrical/Asymmetrical networks and low pass/high pass filters

Course Outcomes:

The students will be able to:

1. Design different types of clippers, clampers and multivibrators
2. Analyze the circuit behavior with and without feedback
3. Distinguish between symmetrical and asymmetrical networks and also between T and π section filters

List of Experiments:

1. Clipping and Clamping Circuits
2. Design and development of Astable multivibrator
3. Design and development of Monostable multivibrator
4. Design and development of Bistable multivibrator
5. Schmitt Trigger
6. Voltage to Frequency converter.
7. Design & frequency response of Single stage and Multistage RC - Coupled amplifier using BJT
8. Design & frequency response of Single stage and Multistage RC - Coupled amplifier using FET
9. Voltage series feedback amplifier
10. Current shunt feedback amplifier
11. RC phase shift oscillator, Hartley oscillator & Colpitts Oscillator
12. Design of Class-A power amplifier
13. Design of Class-B power amplifier
14. Tuned Amplifiers (Single and Double)
15. Design & verification of Constant-K low-pass & high-pass filter

Mini Project cum Design Exercise(s): Example: Design of

i. An audio power amplifier with specified power output and the associated power supply that can take audio input from microphone and deliver the output to a loudspeaker.
ii. Switch Mode Power Supply 'or Linear Power Supply using discrete components.

Suggested Reading:

1. Paul B. Zbar, Albert P, Malvino, Michael A. Miller, "Basic Electronics, A Text- Lab Manual", 7th Edition, TMH, 2001

Special Note: Sessional marks are to be awarded as per the following breakup.

1. 20 marks for the regular lab exercises
2. 5 marks for the Mini project-cum-design exercise(s).

General Note:

1. A total of not less than 14 experiments must be carried out during the Semester
   (Wherever possible, more than 1 lab experiment should be carried out in one lab session of 3 Periods per week).
2. The experiments should be performed on bread board using discrete components
3. There should not be more than 2 students per batch while performing any of the lab experiment
4. Wherever possible, Analysis and design of circuits should be carried out using SPICE tools

EC 227

ANALOG COMMUNICATION LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. Fundamental experimental design of generation and detection of various analog and pulse analog modulation systems.
2. Understand and analyze the radio receiver characteristics.
3. Understand the concept of multiplexing (TDM and FDM) and also to analyze them using spectrum analyzer.

Course Outcomes:

The student will be able to:

1. Design, develop and analyze various analog and pulse analog modulation / demodulation systems.
2. Analyze the basic receiver structure and understand its characteristics.
3. Understand the concept of multiplexing in both time domain and frequency domain.

List of Experiments:

1. AM generation and detection
2. Balanced Modulator
3. FM generation and detection
4. Pre emphasis and De-emphasis circuits
5. Radio Receiver Measurements: Sensitivity, Selectivity and Fidelity
6. Sampling and reconstruction
7. PAM generation and detection
8. PWM generation and detection
9. PPM generation and detection
10. Time Division Multiplexing and De-multiplexing
11. Frequency Division Multiplexing and De-multiplexing
12. PLL Characteristics
13. Spectral Analysis of Video signals generated by TV demonstrator Kit and Pattern Generator using Spectrum analyzer
14. Mixer Characteristics

General Note:

i. At least 10 experiments are to be conducted.
ii. There should not be more than 2 students per batch while performing any of the lab experiment.
iii. Mini Project cum design exercise:
    a. The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.
    b. This exercise carries sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercises.

EG 221

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations. Also to learn the art of communication.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to mange time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate. Also use media with etiquette and know what academic ethics are.

Exercise 1

Communicative Competence – The Art of Communication, basic grammar, Indianisms, Effective listening skills, using English in different situations

Exercise 2

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence

Elements of effective presentation – Structure of presentation – Presentation tools – Body language

Creating an effective PPT

Exercise 3

Interview Skills – Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets

Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews

Exercise 4

Personality Development – Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 5
Corporate Culture – Grooming and etiquette, communication media etiquette
Academic ethics and integrity

Suggested Reading:

1. Madhavi Apte , "A Course in English communication", Prentice-Hall of India, 2007
2. Leena Sen , "Communication Skills", Prentice-Hall of India, 2005
3. Dr. Shalini Verma, "Body Language- Your Success Mantra", S Chand, 2006
4. Edgar Thorpe and Showick Thorpe , "Objective English", 2nd edition, Pearson Education, 2007
5. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010
6. Gulati and Sarvesh, " Corporate Soft Skills", New Delhi: Rupa and Co. , 2006
7. Van Emden, Joan, and Lucinda Becker, "Presentation Skills for Students", New York: Palgrave Macmillan, 2004
8. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989

EC 225

ELECTRONIC ENGINEERING-II

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:
The main objectives of this course are:

1. Learn working of feedback amplifiers, oscillators, multistage amplifiers, power amplifiers and linear and non-linear wave shaping circuits.
2. Have in depth knowledge of basic electronic devices and circuits
3. Pursue any advance level course in electronics.

Course Outcomes:
At the end of this course student will be able to:

1. Design feedback amplifiers and various kinds of oscillators.
2. Analyze and Design various multistage amplifiers.
3. Design of power amplifiers, clipping, clamping and comparator circuits.

UNIT-I
Feedback amplifiers: Concept of Feedback, feedback amplifier configuration, circuits, advantages of negative feedback, analysis of simple feedback amplifiers using BJTs and FETs.

UNIT-II
Oscillators: Barkhausen criterion; RC oscillators; Weinbridge, phase shift, LC, Hartley and colpitts oscillators; Crystal controlled oscillators (Analysis of oscillators using BJTs only), stability of oscillators, Voltage regulators.

UNIT-III
Multistage amplifiers: Cascade and cascode configuration, High input impedance transistor circuits, frequency response of RC coupled amplifiers, Transformer coupled amplifiers, Step response, effect of cascading on bandwidth.
D.C. Amplifiers: Problems of dc amplifiers. Drift compensation techniques, differential amplifiers, importance of CMRR, high CMRR differential amplifier.

UNIT-IV
Power Amplifiers: Classification of power amplifiers, analysis of class A and B power amplifiers; Distortion in amplifiers, push pull amplifiers, complementary symmetry, Phase inverters

UNIT-V

Wave shaping circuits: RC low pass and high pass circuits; response to step, pulse, Ramp, Exponential and Square wave inputs; clipping circuits for single level and two levels; clamping circuits, Comparators

Text Books:

1. Jacob Millman and Christos C. Halkias, "Integrated Electronics", McGraw Hill, 1991.
2. Jacob Millman and Christos C. Halkias, "Electronics Devices and Circuits", McGraw Hill, 3rd Edition, 2010.
3. Jacob Millman and Taub: Pulse, "Digital and Switching wave forms", McGraw Hill, 2003.

Suggested Reading:

1. Sedra and Smith, "Microelectronic Circuits", Oxford University. Press, 5th Edition, 2009.
2. S. Salivahanan & N. Suresh Kumar, "Electronic Circuit Analysis", McGraw Hill, 2nd Edition, 2011.

EC 215

BASIC ELECTRONICS
(Common for CSE, IT, MECH, PROD)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the knowledge of basic semiconductor devices and create foundation for forthcoming circuit design courses.
2. To understand various applications like amplifiers, oscillators and op-amps also motivate and train students in logic design.
3. To understand the working principle of the transducers and aware the students about the advances in Instrumentation.

Course Outcomes:

1. Ability to understand the usefulness of semiconductor devices in circuit making like rectifiers, filters, regulators etc.
2. Ability to develop new directions in logic design to analyze, design and implement combinational circuits.
3. Ability to analyze the principles and practices for instrument design to development the real world Problems.

UNIT - I

Semiconductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current, Hall effect, Law of mass action, Characteristics of P-N Junction diode, current equation, Parameters and Applications.

Rectifiers: Half wave and Full wave Rectifiers Bridge and center tapped with and without filters, Ripple factor, regulation and efficiency.

UNIT - II

Transistors: Bipolar and field effect transistors with their h-parameter equivalent circuits, Basic Amplifiers classification and their circuits (Qualitative treatment only).

Regulators and Inverters: Zener Diode**,** Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator.

UNIT-III

Feedback Amplifiers: Properties of Negative Feedback Amplifier, Types of Negative Feedback, Effect of negative feedback on Input impedance and Output impedance, Applications (Qualitative treatment only).

Oscillators: principle of oscillations, LC Type-Hartley, Colpitt and RC Type- Phase shift, Wien Bridge and Crystal Oscillator (Qualitative treatment only).

UNIT - IV

Operational Amplifiers: Basic Principle, Ideal and practical Characteristics and Applications-Summer, Integrator, Differentiator, Instrumentation Amplifier.

Digital System: Review of basic gates, Universal gates, Demorgan's theorem, minimization with Karnaugh Map up to three variables and realization of half, Full Adder and half, Full Sub tractors.

UNIT - V

Data Acquisition systems: Study of transducers-LVDT, Strain gauge.

Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics and their applications only.

Display Systems: Constructional details of C.R.O and Applications.

Text Books:

1. Robert L. Boylestad, Louis Nashelsky, K. Lal Kishore, "Electronic Devices and Circuits Theory", Pearson Education, 9TH edition, LPE, Reprinted, 2006.
2. S. Shalivahan, N. Suresh Kumar, A Vallavea Raj, "Electronic Devices and Circuits", Tata McGraw
   Hill, 2003
3. Morris Mano, "Digital Design", Pearson Education, Asia 2002.

Suggested Reading:

1. Jacob Milman and C., Halkias, "Electronic Devices", McGraw Hill, Eight Edition, Reprinted, 1985.
2. Ramakanth A. Gayakwad, "Op-AMPS and Linear Integrated Circuits", Prentice Hall of India, 3rd Edition,1985
3. W. D. Cooper, A. Helfric, "Electronic Instrumentation and Measurement Techniques", PHI, 4th Edition.

EC 228

ELECTRONIC ENGINEERING LAB -II
(For EEE)

Instruction	3 Periods per week
Duration of University Examination.	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. Hands on experience of working with different feedback amplifiers, oscillators, wave shaping circuits.
2. Learn applications of different transistor circuits.
3. Understand practical issues in Electronic Engineering lab

Course Outcomes:

Upon completion of this course, the student will be able to

1. Analyze the circuit behavior for various required characteristics.
2. Understand the basics of feedback amplifiers, oscillators, wave shaping circuits and their applications.

List of Experiments:

1. Voltage series feedback amplifier
2. Voltage shunt feedback amplifier
3. Current series feedback amplifier.
4. Current shunt feedback amplifier
5. Hartley Oscillator
6. Colpitt's oscillator
7. RC Phase shift oscillator
8. Wien Bridge Oscillator
9. Linear wave shaping -Integrator & Differentiator
10. Nonlinear wave shaping -Clipping
11. Class-B Power Amplifiers
12. Clamping Circuits(Diode)
13. Difference Amplifier (Op. Amp)
14. Voltage Comparators (Op. Amp)

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text -Lab Manual", 7th Edition, TMH, 1994.
2. Paul B. Zbar, "Industrial Electronics- A Text -Lab Manual", 3rd Edition, TMH,1983.

General Note:

i. There should not be more than 2 students per batch while performing any of the lab experiment.
ii. Mini project cum design exercise:
   a) The students must design, rig-up, and test the circuits wherever possible and should carry out the experiments individually.
   b) This exercise carries sessional marks of 10 out of 25, while the remaining 15 marks are for the remaining lab exercise.

EC 218

BASIC ELECTRONICS LAB
(Common for CSE, IT, MECH, PROD)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices.
3. To study simple electronic circuits.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Understand the knowledge regarding electronic components and equipment.
2. Design various rectifiers and filters .Analysis of characteristic behavior of BJT , FET
3. Design of an amplifier
4. Verify the operation of Op-amp for various applications.

List of Experiments:

1. Study of Electronic components.
2. Characteristics of Semiconductor diodes (Germanium, Silicon and Zener).
3. CRO and its Applications.
4. Half, Full wave rectifiers with and without filters.
5. Voltage Regulator using zener diode.
6. Characteristics of BJT in CE Configuration.
7. Characteristics of FET in CS Configuration.
8. Amplifier with and without feedback.
9. RC Phase shift oscillator
10. Operational Amplifier and its applications.
11. Verification of Logic gates
12. Realization of Half and Full adder

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH, 1994.
2. Paul B. Zbar," Industrial Electronics, A Text - Lab Manual", 3rd Edition.

SYLLABUS OF B.E. III YEAR

OF

FOUR YEAR DEGREE COURSE

IN

ELECTRONICS & COMMUNICATON ENGINEERING

Academic Year 2015-16

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)

Hyderabad – 500 075

SCHEME OF INSTRUCTION AND EXAMINATION
3/4 B.E.
ELECTRONICS & COMMUNICATON ENGINEERING

SEMESTER – I

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 311	Linear Integrated Circuits	4	-	3	75	25	3
2	EC 312	Digital Integrated Circuits	4	-	3	75	25	3
3	EC 313	Computer Organization and Microprocessors	4	-	3	75	25	3
4	EC 314	Control Systems Engineering	4	-	3	75	25	3
5	EC 315	Digital Communication	4	-	3	75	25	3
6	CE 444	Human Values and Professional Ethics (Mandatory course)	2*	-	2	50	-	-
PRACTICALS								
7	EC 316	Integrated Circuits Lab	-	3	3	50	25	2
8	EC 317	Microprocessor and Interfacing Lab	-	3	3	50	25	2
9	EC 318	Digital Communication Lab	-	3	3	50	25	2
		Total	**22**	**9**	**-**	**575**	**200**	**21**

L: Lecture, T: Tutorial, D: Drawing, P: Practical
*: 21 periods per Semester

EC 311

LINEAR INTEGRATED CIRCUITS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To learn the basic building blocks of linear integrated circuits.
2. To study the applications of Operational Amplifiers.
3. To learn the theory and applications of active filters, PLL, 555 timers, ADC and DAC.

Course Outcomes:

1. Understand the building blocks of Op-Amp.
2. Implement the applications of Operational Amplifiers.
3. Analyze and Design of active filters, PLL, 555 Timers, ADC and DAC

Unit – I

Differential Amplifiers: Classification, DC and AC analysis of single/dual input balanced and unbalanced output configurations using BJTs and MOSFETs.

Operational Amplifier: Op-Amp block diagram, ideal Op-Amp Characteristics, Op-Amp and its features, Measurement of Op-Amp parameters: Input and Output offset voltages and currents, Slew rate, CMRR, PSRR. Frequency response and compensation techniques.

Unit – II

Op-Amp Applications I: Inverting and Non-inverting amplifiers with ideal and non-ideal Op-amps, Voltage Follower, Difference Amplifier, Summing Amplifier, ideal and practical Integrator and differentiator, Voltage to Current and Current to Voltage converters, Instrumentation amplifier, Sample and Hold circuit, Log and Antilog amplifiers, Analog multiplier and divider, Precision rectifiers.

Unit – III

Op-Amp Applications II: Comparator, Schmitt Trigger with and without reference voltage, Astable Multivibrator, Monostable Multivibrator, Triangular waveform generator.

Active Filters: Introduction, Analysis of Butterworth first order, second order lowpass and highpass filters, Band-pass filters, Band-stop filters, Notch filter, All-pass filter.

Unit – IV

555 Timer: Introduction and its functional diagram. Modes of operation: Monostable, Astable multivibrators, applications of 555 Timer.

Function Generator: Analysis and Design of Function Generator using IC 8038.
Voltage Controlled Oscillator: Operation and applications using IC 566.
Phase Locked Loops: Introduction, Principles, Block diagram and Description of IC 565, Applications of PLL: frequency multiplication and frequency synthesis.

Unit – V
Regulators: Introduction, Analysis and design of regulators using 78XX and 723 monolithic ICs, Current limiting and Current foldback techniques using IC 723.
Data Converters: Introduction, specifications, DAC- Weighted Resistor, R-2R Ladder, ADC- Parallel Comparator, Successive Approximation and Dual Slope.

Text Books:

1. Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits," 4/e, PHI, 2010.
2. Roy Chowdhury D, Jain S.B.," Linear Integrated Circuits,"4/e, New Age International Publishers, 2010.

Suggested Reading:

1. K.R.Botkar, "Integrated Circuits," 10/e, Khanna Publishers, 2010.
2. David A.Bell, 'Op-Amp & Linear ICs', Oxford, 2013.
3. Sedra and Smith, "Micro Electronic Circuits", 6/e, Oxford University Press, 2009.

EC 312

DIGITAL INTEGRATED CICUITS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To study the characteristics and operations of Bipolar and MOS logic families.
2. To analyze the operations and implementation of various combinational and sequential logic circuits using IC's.
3. To study the architecture and operation of different programmable devices.

Course Outcomes:

1. Understand the characteristics and operation of Bipolar and MOS logic families.
2. Design and implementation of various combinational and sequential logic circuits using IC's.
3. Understand the architecture and operation of different programmable devices.

Unit-I: Bipolar Logic Families

Integrated circuits classification, Integrated circuit package types, pin identification and temperature ranges, IC characteristics. TTL logic family, TTL series, TTL output configurations: open collector, Totem pole, Tri state logic. ECL logic family.

Unit-II: MOS Logic families

MOS logic family (PMOS and NMOS), CMOS logic family and its series characteristics, CMOS transmission gate (bilateral switch) and its applications, CMOS open drain and high impedance outputs. Dynamic MOS logic family, dynamic MOS inverter, dynamic MOS NAND and NOR gates. Comparison of various logic families. Interfacing of logic families: CMOS driving TTL, TTL driving CMOS, ECL driving TTL and TTL driving ECL.

Unit-III: Combinational Circuits

Design using TTL-74XX and CMOS 40XX series: Decoders, drivers for LED and LCD display, Encoder, priority encoder, Multiplexer and their applications, Demultiplexer, Parity generator and Checker circuit, Digital comparator, Parallel and serial binary adder, Subtractor circuits using 2's complement. Carry look-ahead adder, Decimal adder, Decimal Subtractor using 10's complement, Binary Multiplier.

Unit-IV: Sequential circuits

Flip-flops and their conversions. Design of Synchronous and Asynchronous counters, Cascading of BCD counters, applications of counters, Shift register and applications with 74XX and CMOS 40XX series of IC Counters. Sequence generation, Sequence detection.

Unit-V: Memories

ROM, RAM types, Architectures, operation and applications, Flash memory, Expanding word size and capacity, Introduction to PLD's, Architecture of PAL, PLA with operation, Introduction to CPLD and FPGA architectures.

Textbooks:

1. Ronald J. Tocci, Neal S. Widmer & Gregory L.Moss, "Digital Systems: Principles and Applications." PHI, 10/e, 2009.
2. Charles H Roth and Larry L Kinney, "Fundamentals of Logic Design" 7th edition, Cengage Publication, 2014.

Suggested Reading:

1. Jain R.P., "Modern Digital Electornics."4/e, TMH, 2011.
2. Sonde, B.S. "Introduction to system Design using IC's" Wiley, 2/e, 1994.

EC 313

COMPUTER ORGANIZATION AND MICROPROCESSORS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To learn the concepts of computer arithmetic operations, computer instructions and its memory organization
2. To examine the 8086 and 8088 microprocessors in terms of hardware/software and functions of signals generated/accepted.
3. To understand the 8086/8088 architecture and its programming.
4. Explore how to interface the memory and I/O devices to 8086 microprocessor.

Course Outcomes:

1. Mathematically represent and analyze the computer arithmetic operations.
2. Write an assembly language programming for different applications.
3. Design an 8086 based microcomputer by interfacing memory and I/O devices.

Unit- I

Data representation and Computer arithmetic: Introduction to computer systems, organization and architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth's algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards.

Basic Computer organization: Instruction codes, stored program organization, computer registers and common bus system, computer instructions, timing and control, instruction cycle; Program interrupt, Interrupt cycle.

Unit-II

Central Processing Unit: General register organization, stack organization, instruction formats, addressing modes, Data transfer and manipulation, Program control. Characteristics of CISC and RISC.

Memory organization: Memory hierarchy, Primary memory, Auxiliary memory, Cache memory: mapping functions, Virtual memory: address mapping using paging and Segmentation.

Unit–III

8086/8088 Microprocessor: Architecture and Pin diagram of 8086/8088 microprocessor, Register organization, Memory organization, Instruction set, Minimum and Maximum mode operations, 8086 control signal interfacing under minimum mode system, control signal interfacing under maximum mode

using multiprocessing systems. Addressing modes, Interrupt structure. Brief overview of x86 series microprocessors.

Unit–IV

8086 Assembly Language programming: Assembler directives and operators, programs using data transfer, arithmetic, logical, branching and ASCII instructions. String processing, Procedures, Macros and stack, Basic programs using DOS functions. Introduction to assemblers and debugging tools.

Unit–V

8086 Interfacing: Memory interfacing using standard RAM, EPROM IC Chips, 8255 PPI, 8253/8254 programmable interval timers, 8257 DMA controller, 8279 Keyboard and display controller interfacing and 8251 programmable communication interface. Serial and parallel data transmission formats, USART interfacing.

Text Books:

1. Morris Mano M. "Computer System Architecture" , 3/e, Pearson Education, 2005.
2. Ray A.K. and Bhurchandi, K.M., “Advanced Microprocessor and peripherals”, 2/e TMH –2007.
3. Barry B. Brey, “The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro, Pentium II, III, IV”, Pearson Education, 2006.

Suggested Reading:

1. William Stallings, "Computer Organization and Architecture Designing for performance" 7/e, Pearson Education, 2006.
2. Douglas V Hall, “Microprocessors and interfacing, Programming and Hardware”, 2/e, TMH, 2006.

EC 314

CONTROL SYSTEMS ENGINEERING

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To acquire the basic concepts of automatic control systems
2. To learn the basics of control systems representations/modeling
3. To learn stability analysis in time and frequency domains.

Course Outcomes:

1. Represent the mathematical model of a system and analyze the stability of the system.
2. Determine the response of different systems to a step input. Analyze the system in frequency domain.
3. Understand the discrete data control systems and modern control systems

Unit I

Control System Fundamentals and Components: Classification of control systems, Open and closed loop systems, Control system components; Error sensing devices - potentiometers, synchros, AC & DC servo motors, Mathematical modeling of mechanical systems and their conversion into electrical systems. Block diagram reduction and signal flow graphs.

Unit II

Time response: Transfer function and Impulse response, Types of inputs, Transient response of second order system for step input, Time domain specifications. Types of systems, static error coefficients, error series, Routh - Hurwitz criterion for stability. Root locus techniques: Analysis of typical systems using root locus techniques. Effect of location of roots on system response.

Unit III

Frequency response plots: Bode plots, frequency domain specifications. Gain margin and Phase Margin. Principle of Argument, Nyquist plot and stability criterion.
Compensation: Cascade and feedback compensation using Bode plots. Phase lag, lead, lag-lead compensators. PID controller.

Unit IV

Discrete Data Control Systems: Digital control system, advantages and disadvantages, digital control system architecture, Discrete transfer function, Sampled data system, Transfer function of sample data systems and Stability of discrete data systems.

Unit V

State Space Representation: Concept of state and state variables. State models of linear time invariant systems, State transition matrix and solution of state equations, Controllability and Observability, Design of digital control systems using state space concepts.

Text Book:

1. I.J .Nagrath & M.Gopal, "Control Systems Engineering", New age international Publishers, 5/e 2012.
2. Benjamin C. Kuo, "Automatic Control Systems", 7/e, PHI , 2010.

Suggested Reading:

1. K. Ogata, "Modern Control Engineering", EEE, 5/e, PHI, 2003
2. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", 11/ e Pearson 2008.
3. Gopal Madan, "Digital Control Engineering" 1/e, New age publishers, 2008.

EC 315

DIGITAL COMMUNICATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To learn various digital pulse modulation and digital carrier modulation techniques.
2. To learn the different source coding and channel coding schemes.
3. To learn the need for spreading a code and various spread spectrum techniques.

Course Outcomes:

1. Understand the knowledge of digital pulse modulation and digital carrier modulation techniques.
2. Analyze the different source coding and channel coding schemes.
3. Understand various spread spectrum techniques.

Unit-I

Digital Transmission of Analog Signals: Elements of a digital communication system, Uniform quantization, PCM system, Bandwidth requirement of PCM system, Noise in PCM Systems, Non-uniform quantization, TDM-PCM system. Introduction to linear prediction theory, Differential quantization, Differential PCM system, Delta Modulation, Noise in DM system, ADM. Comparison of PCM and DM systems.

Unit-II

Information Theory: Uncertainty, Information and Entropy. Source coding: Shannon – Fano algorithm and Huffman coding. Discrete memoryless channels, Probability relations in a channel, priori and posteriori entropies, cascaded channels, mutual information, Channel capacity, information rate and information capacity. Rate distortion theory.

Unit-III

Error Control Coding: Need for error control coding, Types of transmission errors. Linear Block Codes (LBC): description of LBC, generation, Syndrome and error detection, minimum distance of a block code, error detecting capabilities and error correcting, Standard array and syndrome decoding, Binary cyclic codes (BCC): description of cyclic codes, encoding, decoding and error correction of cyclic codes using shift registers, Convolution codes: description, encoding,decoding: Exhaustive search method and sequential decoding.

Unit-IV

Digital Carrier Modulation Schemes: Optimum receiver for Binary Digital Modulation Schemes, Binary ASK, PSK, DPSK, FSK signaling schemes and their error probabilities. Introduction to MSK, Comparison of Digital Modulation Schemes. M-ary Signaling Schemes, M-ary coherent PSK(QPSK only). Synchronization methods.

Unit –V

Spread-Spectrum Modulation: Need for spreading a code, generation and properties of PN sequence. Direct Sequence Spread Spectrum, Frequency Hopping spread spectrum systems and their applications. Syncronization in Spread Spectrum Modulation.

Text Books:

1. Simon Haykin, "Communication Systems," 4/e, Wiley India, 2011.
2. Sam Shanmugham.K., "Digital and Analog Communication Systems," Wiley, 1979.

Suggested Reading:

1. Herbert Taub, Donald L. Shilling & Goutam Saha, " Principles of Communication Systems," 4/e, Tata McGraw-Hill Education 2013.
2. R.P. Singh, S.D. Sapre, "Communication Systems", 2/e, Tata McGraw-Hill Education, 2008.

EC 316

INTEGRATED CIRCUITS LAB

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To measure the characteristics of Op Amp and implementing the arithmetic circuits, filters, oscillators using Op Amp.
2. To analyze the operation and implementation of circuits using IC 566, IC 723, IC 555.
3. To Design and Implementation of Combinational and Sequential Circuits.

Course Outcomes:

1. Measure the characteristics of Op-Amp and implement the arithmetic circuits, filters, oscillators using Op Amp.
2. Analyze the operation and implement of circuits using IC 566, IC 723, IC 555
3. Design and Implement of Combinational and Sequential Circuits.

Lab Experiments

Part-A

1. Measurement of Op-Amp parameters.
2. Voltage Follower, Inverting and Non Inverting Amplifiers using Op-Amp.
3. Arithmetic Circuits: Summer, Subtractor, Integrator and Differentiator using Op-Amp.
4. Active filters: LP, HP and BP using Op-Amp.
5. Astable, Monostable multi vibrators using Op-Amp.
6. Triangle and Square wave generators using Op-Amp.
7. Voltage Controlled Oscillator Using IC 566.
8. Low and High Voltage Regulators using IC 723.
9. Astable, Monostable multi vibrators using IC 555 Timer.

Part-B

1. Measurement of propagation delay, fan-out, Noise margin and transfer Characteristics of TTL and CMOS IC gates.
2. (a) Design of code converters using logic gates.
   (b) Parity generator and checker circuits.
3. Logic function Implementations using Multiplexers

4. Arithmetic Circuits: Binary adder and subtractor, BCD adders using IC's.
5. Flip-Flop operations and conversions using gates and ICs
6. Design of Synchronous, Asynchronous up/down counters.
7. Shift registers and ring counter using ICs.
8. Interfacing counters with 7-segment LED display units.

General Note:

1. At least 5 experiments from each part.
2. At least 3 or 4 experimetns should be carried out using SPICE tools.

Reference Book: Laboratory Manual.

Mini Project cum Design Exercise(s):

To realize and design mini project using either linear or digital or combination of linear and digital IC's (giving specifications for each project).

a) Design a crystal oscillator for the given specifications frequency= 1 KHZ, Amplitude=1 Vpp, duty cycle=50%.
b) Design a universal shift register using JKFF.
c) Construct an electronic harmonium using 555 Timer that performs server rhythemic sounds.
d) Design of Digital clock.
e) Design of Security Monitoring system

CE 444 **HUMAN VALUES AND PROFESSIONAL ETHICS**

Instructions	: 21 Periods per semester (7*3)
Duration of University Examination	: 2 Hours
University Examination	: 50 Marks
Sessional	: Nil
Credits	: Nil

Course Objectives:

1. To develop the critical ability among students to distinguish between what is of value and what is superficial in life
2. To enable the students understand the values, the need for value adoption and prepare them meet the challenges
3. To enable the students develop the potential to adopt values, develop a good character and personality and lead a happy life
4. To motivate the students practice the values in life and contribute for the society around them and for the development of the institutions /organisation around they are in.
5. To make the students understand the professional ethics and their applications to engineering profession

Course Outcomes

1. Students develop the capability of shaping themselves into outstanding personalities, through a value based life.
2. Students turn themselves into champions of their lives.
3. Students take things positively, convert everything into happiness and contribute for the happiness of others.
4. Students become potential sources for contributing to the development of the society around them and institutions / organisations they work in.
5. Students shape themselves into valuable professionals, follow professional ethics and are able to solve their ethical dilemmas.

UNIT-1 Concepts and Classification of Values –Need and challenges for value Adoption

Definition of Values – Concept of Values – Classification of Values – Hierarchy of Values – Types of Values –Espoused and Applied Values – Value judgement based on Culture – Value judgement based on Tradition – Interdependence of Values

Need for value education – Findings of Commissions and Committees - Corruption and illegal practices – Science and Technology without values- Exploitation of nature – Increasing use of violence and intoxicants – Lack of education in values – Implications of education in values – Vision for a better India

Challenges for Value adoption – Cultural, Social, Religious, Intellectual and Personal challenges

UNIT – 2: Personal Development and Values in Life Personal Development: Enlightened self-interest – Accountability and responsibility – Desires and weaknesses – Character development – Good relationships, self-restraint, Spirituality and Purity – The quest for Character – Tests of Character – The key to good character

Values in Life: Building an ethical policy – Integrating values in everyday life – Archaic Social Values – Parenting practices – Critical Thinking - Analyzing and Prioritizing values – Practicing Yoga and Meditation

UNIT – 3: Practicing Values for the development of Society

Resentment Management and Self-analysis – Positive Thinking and Emotional Maturity – The importance of Women , Children and Taking care of them – Helping the poor and needy – Fighting against addictions and atrocities – Environmental awareness – Working for the Sustainable development of the society

Values in Education system: Present Scenario- Engineering education –Current trends- Need for quality improvement- Adoption of value education – Principles of Integrity-Institutional Development.

UNIT – 4: Basic Concepts of Professional Ethics

Ethics, Morals and Human life , Types of Ethics, Personal Ethics, Professional ethics, Ethical dilemmas, Indian and Global thoughts on ethics, Profession, Professional and Professionalism, Ethical role of a professional Basic ethical principles, Some basic ethical theories, use of ethical theories.

Science, Religion Ethics, Genders and ethics, Media and ethics, Computer Ethics, Case Studies on Professional Ethics, Exemplary life sketches of prominent Indian personalities

UNIT-5: **Ethics in engineering profession**

Engineering profession-Technology and Society-Engineering as Social Experimentation-Engineering ethics-Ethical obligations of Engineering Professionals-Role of Engineers-Engineers as Managers-Professional responsibilities of Engineers- Engineers Responsibility for Safety- A few Case Studies on Risk management

Conflicts of Interest- Occupational Crimes- Plagiarism-Self plagiarism-Ethics Audit-Consideration for ethics audit-Ethics Standards and Bench Marking

Text Books:

1. Subramanian R., " Professional Ethics " , Oxford University Press , 2013
2. Nagarajan R.S., " A Text Book on Human Values and Professional Ethics " New Age Publications , 2007
3. Dinesh Babu S., " Professional Ethics and Human Values " , Laxmi Publications , 2007

Reference Books:

4. SantoshAjmera and Nanda Kishore Reddy " Ethics , Integrity and Aptitude " ,McGrawhill Education Private Limited , 2014
5. GovindaRajan M., Natarajan S., Senthil Kumar V.S." Professional Ethics and Human Values " Prentice Hall India Private Limited ,2012
6. Course Material for Post Graduate Diploma In "Value Education & Spirituality " Prepared by Annamalai University in Collaboration with Brahma Kumaris , 2010

EC 317

MICROPROCESSOR AND INTERFACING LAB

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

To Develop and understand the Assembly language programming concepts of 8086 Microprocessor.

Course Outcomes:

1. Write the 8086 assembly language programs on arithmetic, logical operations and DOS function calls.
2. Interface memory and I/O devices with 8086 microprocessor.
3. Design and develop the 8086 based microcomputer system for various applications.

Lab Experiments

1. Programs using Arithmetic operations, Branching Operations.
2. Logical operations and string operations.
3. Multiplication and division for signed/unsigned data.
4. Single byte, multi byte binary and BCD addition and subtraction.
5. Code conversions.
6. String Searching and Sorting.
7. Using DOS function calls.
8. Interfacing traffic signal control using 8086.
9. Generation of waveforms using DAC interface.
10. Interfacing stepper motor control using 8086.
11. Interfacing 7 -segment LED (Common Cathode/Common Anode) displays.
12. Generation of waveforms and gating applications using 8253/8254 timers.
13. Real time clock using 8086.
14. Interfacing Elevator simulator control using 8086.

Mini Project cum Design Exercise(s).

To design and realize a mini project using 8086 microprocessor and interface modules.

Suggested Reading:

1. Walter A. Triebel, Avtar Singh “The 8088 and 8086 Microprocessors: Lab Manual” PHI 2nd Edition 2000

EC 318

DIGITAL COMMUNICATION LAB

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To carry out experiments on various pulse digital modulation and digital carrier modulation techniques.
2. To verify the Line coding techniques.
3. To verify the error control coding schemes.

Course Outcomes:

1. Analyze the pulse digital modulation and digital carrier modulation schemes through experiments.
2. Analyze the Line coding techniques.
3. Measure the error controlling schemes.

List of Experiments:

1. PCM generation and detection.
2. Error control coding.
3. Data formats / Line coding.
4. Linear Delta Modulation and demodulation.
5. Adaptive Delta Modulation and demodulation.
6. ASK generation and detection.
7. FSK generation and detection.
8. BPSK generation and detection.
9. QPSK generation and detection.
10. Minimum Shift Keying generation and detection.
11. Modem characteristics.
12. Wavelength division multiplexing and demulitiplexing.

General Note: At least 10 experiments are to be conducted.

Reference Book: Laboratory Manual.

Mini Project:

1. Develop a code for different digital modulation schemes and verify through simulation.
2. Design different Line coding schemes using logic Gates.
3. Study and design the multiplexing techniques.

SCHEME OF INSTRUCTION AND EXAMINATION
3/4 B.E.
ELECTRONICS & COMMUNICATON ENGINEERING

SEMESTER – II

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 321	Microcontrollers and Applications	4	-	3	75	25	3
2	EC 322	Microwave Engineering	4	-	3	75	25	3
3	EC 323	Digital Signal Processing	4	-	3	75	25	3
4	EC 324	Mobile Cellular Communications	4	-	3	75	25	3
5	___	Elective-I	4	-	3	75	25	3
PRACTICALS								
6	EC 326	Microcontroller Lab	-	3	3	50	25	2
7	EC 327	Microwave Lab	-	3	3	50	25	2
8	EC 328	Digital Signal Processing Lab	-	3	3	50	25	2
Total			**20**	**9**	**-**	**525**	**200**	**21**

L: Lecture, T: Tutorial, D: Drawing, P: Practical

S.No.	CODE	ELECTIVE – I
1	EC 351	Coding Theory and Techniques
2	EC 352	Optical Fiber Communication
3	EC 353	CPLD and FPGA Architectures
4	EC 354	Analog and Mixed IC Design
5	EC 355	System Automation and control

EC 321

MICROCONTROLLERS AND APPLICATIONS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the 8051 and ARM Microcontroller architecture and instruction set.
2. To acquire the knowledge of interfacing memory and I/O devices.
3. To learn the 8051and ARM based embedded applications.

Course Outcomes: Students will be able:

1. Write an assembly language programming and Embedded C programming for different applications.
2. Interface memory and I/O devices to 8051/ARM.
3. Design a Microcontroller based embedded system for various applications.

UNIT-I

8051 Microcontroller: Introduction to Microcontroller, Overview of 8051 family, Internal Architecture of 8051, PSW, Pin description, I/O Ports, Memory organization and expansion. 8051 Instruction set: Addressing modes and Bit addressable features, Data transfer, Arithmetic, Logical, Program branching and bit manipulation instructions.

UNIT-II

8051 Programming: Introduction to 8051 programming development tools, basic programming using instruction set, Introduction to 8051 C Programming, SFRs, 8051 Timer Programming in Assembly and C, 8051 Serial port Programming in Assembly and C, 8051 Interrupt Programming in Assembly and C.

UNIT-III

8051 Interfacing: 8051/8031 interfacing to external memory(RAM, ROM), 8255(PPI) interfacing, LCD and Keyboard Interfacing, Digital to Analog converter, Analog to Digital converter and sensor interfacing, Relay and PWM, DC Motor interfacing, Stepper Motor interfacing.

UNIT-IV

ARM: ARM Design Philosophy, ARM Processor families, Architecture-revisions, Registers, Current Program Status Register, pipeline, exception, interrupts and the vector table; core extensions, introduction to ARM instruction set.

UNIT-V

Applications of Microcontrollers: Design and development of the applications in the area of communications (GSM module, GPS, Zigbee), Keil IDE features and RTOS with 8051 in the area of automotive applications.

Suggested Reading:

1. Mazidi M.A, Mazidi JG, & Rolin D. Mckinlay, "*The 8051 Microcontroller & Embedded Systems using Assembly and C* ", 2/e, Pearson Education, 2007.
2. Andrew N.Sloss, Domonic Symes, Chris Wright "*ARM System Developers Guide Designing and optimizing system software*" Elsevier 1st Edition 2004.

References:

1. Ayala, K.J., "*The 8051 Microcontroller Architecture, Programming and Applications*", Penram International, 2007.
2. Rajkamal, "*Microcontrollers Architecture, Programming Interfacing and system Design*", Pearson Education 2007.
3. Steve Furber., "*ARM System-on-Chip Architecture*" 2nd Edition Addison-Wesley, 2000.

EC 322

MICROWAVE ENGINEERING

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To prepare students to understand basic principle of microwave and its applications.
2. To prepare students to understand different microwave components and analyzing different type of junctions used in microwave engineering.
3. To teach the students about various microwave solid state devices and their characteristics.

Course Outcomes:

1. Students will be able to calculate cut off frequency, identify possible modes and obtain mode characteristics of Reflex Klystron and Gunn oscillator.
2. The students would be able to understand the principles of operation of waveguide, gyrator, isolator attenuator etc. and obtain scattering matrix for various junctions like E-plane, H plane, Circulator, Direction Coupler.
3. Students will know the basics of microwave solid state devices such as Gunn diode and Avalanche Devices such as IMPATT, TRAPATT diodes and efficiently use them in microwave engineering applications.

UNIT - I

Guided Waves: Propagation of TE, TM and TEM waves between parallel planes. Velocity of propagation, wave impedance, attenuation in parallel plane guides.

UNIT - II

Waveguides: TE and TM waves in rectangular and circular waveguides, Wave Impedance, Characteristic Wave Impedance, Attenuation and Q of waveguides. Cavity resonators, resonant frequency and Q, Applications of cavity resonator.

UNIT - III

Microwave Circuits and Components: Concept of Microwave circuit, Normalized voltage and current, Introduction to scattering parameters and their properties, S parameters for reciprocal and Non-reciprocal components- Magic Tee, Directional coupler, E and H Plane Tees and their properties, Attenuators, Phase Shifters, Isolators and circulators.

UNIT- IV

Microwave Tubes: High frequency limitations of conventional tubes, Bunching and velocity modulation, mathematical theory of bunching, principles and operation of two cavity, multi cavity and

Reflex Klystron. Theory of crossed field interaction; Principles and operation of magnetrons and crossed field amplifiers, TWT and BWO.

UNIT – V

Microwave Solid State Devices: Principles of operation, characteristics and applications of Varactor, PIN diode, GUNN diode and IMPATT diode. Elements of strip lines, microstrip lines, slot lines and fin–lines.

Microwave measurements: Microwave bench set up to obtain characterstics of RKO and Gunn oscillator, VSWR measurement, Impedence measurement, measurment of coupling coefficent and direcvity of directionnal couplers, Measurement of radiation patterns and gain for horn antenna.

Text Books:

1. E. C. Jordan & Keith G. Balmain, "Electromagnetic Waves and Radiating Systems", 2/e, Pearson Education, 2006.
2. Samuel Y. Liao, "Microwave Devices and Circuits", 3/e, Pearson Education, 2003.

Suggested Reading:

1 Rizzi P, "Microwave Devices and Circuits", 3/e, Pearson Education, 2003.

2 R. E. Collins, "Foundations for Microwave Engineering", 2/e, Wiley India Pvt. Ltd., 2012.

3. Sushrut Das, "Microwave Engineering" 1/e, oxford press, 2014.

EC 323

DIGITAL SIGNAL PROCESSING

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To design digital IIR and FIR filters for the given specifications.
2. To learn the basics of Multirate digital signal processing and its applications
3. To learn the DSP processor architecture for the efficient implementation of digital filters.

Course Outcomes:

1. Design and implement FIR and IIR filters for the given specifications.
2. Understand the concepts of Multirate digital signal processing and its applications.
3. Implement the filters using DSP Processors.

Unit-I

Fourier Transform: Overview of Discrete time Fourier Transform (DTFT), Discrete Fourier transform (DFT),Properties of DFT, Efficient computation of DFT-Fast Fourier Transform (FFT) algorithms: Radix-2 FFT algorithms – Decimation in Time, Decimation in Frequency algorithms, Inplace computation, bit reversal algorithm. Use of FFT algorithms in Linear Filtering and Correlation.

Unit-II

FIR Filter Design: Amplitude and phase responses of FIR filters – Linear phase filters –Windowing technique for design of FIR filters – Rectangular, Bartlet, Hamming, Blackman, Kaiser Windows. Realization of filters-Direct form-I and II, cascade and parallel forms of FIR and IIR filters. Finite word length effects.

Unit-III

IIR Filter Design: Butterworth and Chebychev approximation, IIR digital filter design techniques-Impulse Invariant transformation, Bilinear transformation techniques, Butterworth and Chebychey filters. Spectral transformation techniques. Comparison between FIR and IIR filters.

Unit- IV

Multirate Digital Signal Processing: Introduction -Decimation by a Factor -D, Interpolation by a Factor -I, Sampling Rate Conversion by a Rational Factor -I/D. Implementation of Sampling Rate Conversion, Multistage implementation of Sampling Rate Conversion, Sampling Rate Conversion by an arbitrary factor, Applications of Multirate Signal Processing.

Unit-V

DSP Processors: Introduction, Differences between DSP and General Purpose Processor architectures, need for DSP processors. General purpose DSP processors: TMS 320C54XX processor, architecture, addressing modes, instruction set.

Text Books:

1. Alan V. Oppenheim & Ronald W. Schafer, "Digital Signal Processing," PHI, 2/e, 2010.
2. John G. Proakis & Dimtris G. Manolakis, "Digital Signal Processing Principles, Algorithms and Application," PHI, 4/e, 2007.
3. Avtar Singh & S. Srinivasan, "Digital Signal Processing Implementation using DSP microprocessors", Thomson Brooks, 2/e, 2004.

Suggested Reading:

1. Chi- Tsong Chen, "Digital Signal Processing Spectral Computation and filter Design", Oxford, 2/e, 2007.
2. Tarunkumar Rawat, "Digital Signal Processing", First edition, Oxford, 2015.

EC 324

MOBILE CELLULAR COMMUNICATIONS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives:

1. To understand the concept and implementation of frequency reuse and Handoff techniques and to analyze interference and capacity enhancement.
2. To appreciate the factors influencing outdoor and indoor propagation systems and to analyze various multiple access protocols based on their merits and demerits.
3. To visualize the system architectures and implementation of GSM and CDMA based mobile communication systems.

Course outcomes:

1. Design a Cellular layout for Mobile communications using frequency reuse for maximum coverage, less interference and optimum capacity.
2. Chose an appropriate Propagation model for either Outdoor or Indoor cellular communication and to identify the salient features protocols pertaining to various multiple access systems.
3. Analyze the system specifications of either GSM or CDMA based Mobile Communication systems and how they have been changing from generation to generation.

UNIT - I

Basic Cellular system and its operation: frequency reuse, channel assignment strategies, Handoff process, factors influencing handoffs, handoffs in different Generations, Interference and system capacity, Cross talk, Enhancing capacity and cell coverage, Trunked radio system, grade of service as per Erlang's B system.

UNIT – II

Propagation models: Free space propagation model, three basic propagation mechanisms, practical link budget design using path loss models, outdoor propagation models: Durkin's model and indoor propagation model, partition losses. Small scale multipath propagation, Parameters of mobile multipath channels, Diversity reception, types of small scale fading.

UNIT – III

Multiple Access Techniques: FDMA, TDMA, SSMA, FHMA, CDMA, SDMA.

UNIT – IV

GSM & CDMA Technologies: GSM: Services and Features, System architecture, Radio Sub system, Channel Types, Frame structure and Signal processing. CDMA: Digital Cellular standard IS-95, Forward Channel, Reverse Channel. Introduction to CDMA 2000.

UNIT – V

Technology Trends & Specifications : WLAN, Bluetooth, PAN, introduction to OFDM in Wireless communication Trends in Radio and Personal Communications, UMTS system architecture and Radio Interface, Comparison of 1G, 2G, 2.5G and 3G technology, Features of 4G,

Text Books:

1. Theodore.S. Rappaport, "Wireless Communications: Principles and Practice", 2/e, Pearson Education, 2010
2. William. C.Y.Lee, "Mobile Communication Engineering", 2/e , Mc-Graw Hill, 2011.
3. T.L.Singal "Wireless Communication Systems", 1/e, TMH Publications, 2010.

Suggested Reading:

1. William.C.Y.Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", 2/e, Mc-Graw Hill, 2011.
2. Dharma Prakash, Quing-an-Zeng, Agarwal, "Introduction to Wireless & Mobile Systems", Cengaje Publications, 3rd edition, 2012.

EC 326

MICROCONTROLLER LAB

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

To develop and understand the assembly and embedded C programming concepts of 8051 Microcontroller

Course Outcomes:

1. Write and test the assembly language programs on arithmetic and logical operations.
2. Write and test embedded C programming on interfacing modules
3. Design and develop the 8051 based embedded systems for various applications

I. List of Experiments

1.2.3. Familiarity and use of 8051 Microcontroller trainer - Instruction set for simple program (using 4 to 15 lines of instruction Code) for data transfer, manipulation, Arithmetic perations, Branching operations, logical operations and testing of "byte/bit patterns" in a given data.

4. Timer and Counter operations & Programming using 8051.
5. Interfacing 8051 with DAC to generate the waveforms
6. Interfacing traffic signal control using 8051.
7. Program to control stepper motor using 8051.
8. LEDs and Switches interfacing with 8051 programming in C.
9. Relay and Buzzer interfacing with 8051 programming in C.
10. LCD interfacing with 8051 programming in C.
11. ADC interfacing with 8051 programming in C.
12. DC Motor interfacing with 8051 programming in C.
13. 7-Segment display interfacing with 8051 programming in C.
14. Elevator simulator interfacing with 8051 programming in C.
15. RTC interfacing with 8051 programming in C

Mini Project cum Design Exercise(s).

To design and realize a mini project using 8051/ARM and interfacing modules.

Suggested Reading:

1. Myke Predko - Programming and Customizing the 8051 Microcontroller, TMH, 2005.

EC 327

MICROWAVE LAB

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. The student would understand the characteristics of RKO and Gunn oscillator.
2. Measurement of frequency and wavelengths would be learnt by the student.
3. VSWR various TEES would be understood by the student.
4. Radiation pattern would be learnt by the student for horn antenna.

Course Outcomes:

After undergoing the course, the student would be able to

1. Analyze the characteristics of RKO and Gunn oscillator are drawn and studied by the student.
2. Measure the frequency and guided wavelength are found and measured by the student.
3. Estimate the VSWR for various loads and S-Matrix for various microwave devices.
4. Obtain the horn antenna radiation pattern.

LIST OF EXPERIMENTS

1. Characteristics of Reflex Klystron oscillator, finding the mode numbers and efficiencies of different modes.
2. Characteristics of Gunn diode oscillator, Power Output Vs Frequency, Power Output Vs Bias Voltage.
3. Measurement of frequency and Guide wavelength calculation:
   i. Verification of the relation between Guide wavelength, free space wavelength and cutoff wavelength of X- band rectangular waveguide.
   ii. Verification of the straight line relation between $(1/\lambda_g)^2$ and $(1/\lambda_0)^2$ and finding the dimension of the guide.
4. Measurement of low and high VSWRs: VSWR of different components like matched terminals, capacitive and inductive windows, slide screw tuner for different heights of the tuning posts etc.
5. Measurement of impedance for horn antenna, Matched load and slide screw tuner.
6. To find the S-parameters of Directional coupler.
7. To find the S-parameters of Tees: E plane, H plane and Magic Tee.
8. To find the S-parameters of Circulator.
9. Measurement of radiation patterns for basic microwave antennas like horn and parabolic reflectors in E-plane and H-plane. Also to finding the gain, bandwidth and beamwidth these antennas.

10. Study of various antennas like dipoles, loops, Yagi antenna, log periodic antenna and their radiation pattern.

Mini Project:

i. To design microwave components such as: Directional couplers, circulators and Hybrid junctions using Simulation software.

ii. To design antenna arrays such as: Binomial, Chebyshev, using Simulation software.

EC 328

DIGITAL SIGNAL PROCESSING LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. Design the IIR and FIR filters using matlab.
2. Design multistage decimator using matlab.
3. Study the operation and performs of TMS320C6713 floating point processor.

Course Outcomes:

1. Design and implement digital filters using matlab.
2. Design and implement mutlirate techniques using matlab.
3. Implement digital filters using TMS320C6713 floating point processor.

(A) Experiments on signal processing using MATLAB.

1. Basic matrix operations and Generation of test signals.
2. Linear Convolution, circular convolution and Correlation.
3. DFT and FFT algorithm.
4. FIR filter design using different windows.
5. IIR filter design: Butter worth, chebyshev type 1 and 2: LPF, HPF, BPF &BSF filter.
6. Spectral Analysis of noisy signal using Welch's method.
7. Interpolation and Decimation.
8. Multistage filter.

(B) Experiments on DSK and CCS

1. Familiarity with CCS and DSK kit.
2. Response of a LTI system to a ramp/step input.
3. Linear Convolution.
4. Discrete Fourier Transform (DFT).
5. Implementation of FIR filter.
6. Implementation of second order IIR filters.

Note:

1. Minimum of 6 from Part A and 4 from Part B is mandatory.
2. For section "A", MATLAB with toolboxes like Signal Processing, FDA or LAB VIEW software can be used.

Reference Book:

1. Vinay K.Ingle and John G. Proakis, "Digital Signal Processing using MAT LAB ", 4/e, Cengage learning, 2011.
2. B.Venkataramani and M. Bhaskar, "Digital Signal Processor Architecture, Programming and Application", sixth edition, TMH, 2006.

EC 351

CODING THEORY AND TECHNIQUES

(ELECTIVE – I)

Instruction	4 Periods/week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To study the importance of channel coding techniques in digital communications.
2. To learn the mathematical structure and algorithms for RS and turbo codes.

Course Learning Outcomes:

1. Understand the theory and principles of channel Coding and techniques.
2. Analyze the performance of RS and turbo codes.

Unit-I

Coding for Reliable Digital Transmission and Storage: Introduction, Types of codes, Types of errors, Channels models, Modulation and coding, channel coding Theorem, Channel coding gain.

Unit II

Linear Block codes: Introduction, encoding, syndrome decoding, error-detecting and correcting capabilities, Maximum likelihood decoding.

Cyclic codes: Description, encoding and syndrome decoding.

Unit III

Galois Fields: Groups, Fields, Binary arithmetic, Construction of Galois Fields GF(2^m), Basic properties of Galois Fields.

RS codes: Introduction, encoding and decoding (Berlekamp-Massey algorithm).

Unit IV

Convolution codes: Introduction, Encoding, State diagram, Trellis diagram, Decoding -Maximum-Likelihood decoding, soft decision and hard decision decoding, Viterbi algorithm.

UNIT V

Turbo codes: Concatenation, Types of Concatenation, interleaving, types of interleavers, Turbo codes: Introduction, encoding and decoding (BCJR Algorithm).

Text books:

1. Shulin and Daniel J. Costello, Jr. “Error Control Coding,” 2/e, Pearson, 2011.
2. L.H.Charles LEE “Error control block codes for Communication Engineers”, Artech, 2000.

Suggested readings:

1. Simon Haykin, “Communication Systems”, 4/e, Wiley, 2000.
2. K Sam Shanmugum, “Digital and Analog Communication Systems”, Wiley, 2005.

EC 352

OPTICAL FIBER COMMUNICATION

(ELECTIVE – I)

Instruction	4 Periods/week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Learn concepts of propagation through optical fiber, Losses and dispersion thorugh optical fiber.
2. Understand operating principles of light sources and detecters used in optical transmitters and Receivers.
3. Design an optical link in view of loss and dispersion.

Course Outcomes:

1. To analyze the propagation thourgh optical fiber for different modes and understand different sources of loss and dispersion.
2. To study optical transmitters and receivers.
3. To design an optical fiber link based on power budget and time budgets.

UNIT – I

Elements of Optical Fiber Systems: Fiber Transmission link, Ray Optics, Optical Fiber Modes and Configurations, Mode theory of Circular Waveguides, Overview of Modes and Key concepts, Linearly Polarized Modes, Single Mode Fibers and Graded Index fiber structure.

UNIT – II

Losses and Dispersion: - Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Waveguides-Information Capacity determination, Group Delay, Material Dispersion, Waveguide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in Guided Index fibers, Mode Coupling, Design Optimization of Single Mode fibers-Refractive Index profile and cut-off wavelength.

UNIT – III

Optical Transmitters: Direct and indirect Band gap materials, LED structures, Light source materials, Quantum efficiency, LED power, Modulation of LED, laser Diodes, Modes and Threshold condition, Rate equations, External Quantum efficiency, Resonant frequencies, Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers, Power Launching and coupling, Lensing schemes, Fiber-to-Fiber joints, Fiber splicing.

UNIT – IV

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

Link design considerations: Point-to-Point link -Link Power budget, Rise - time budget, Noise Effects on System Performance, Operational Principles of WDM, Erbium-doped Amplifiers.

Text Books:

1. Gourd Keiser, "Optical Fiber Communication" TMH, 4/e, 2000.
2. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.

Suggested Readings:

1. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.
2. Binh, “Digital Optical Communications”, First Indian Reprint 2013, (Taylor & Francis), Yesdee Publications.

EC 353

CPLD & FPGA ARCHITECTURES

(ELECTIVE – I)

Instruction	4 Periods/week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Familiarization of various complex programmable Logic devices of different families.
2. To study Field programmable gate arrays and realization techniques.
3. To study different case studies using one hot design methods and studying System level Design

Course Outcomes:

1. Implementation of various logic circuits on PLDs, CPLDs and FPGAs.
2. Analyze different FSM techniques like petrinets.

UNIT I

Programmable logic: ROM ,PROM ,PLA,PAL,SPLD, CPLD and FPGA, Features, Architectures, Programming, Applications and Implementation of MSI circuits using Programmable logic Devices.

UNIT II

CPLD's: Complex Programmable Logic Devices, logic block, I/O block, interconnect matrix, logic blocks and features of Altera flex logic 10000 series CPLD's , max 7000 series CPLD's, AT & T – ORCA's (Optimized Reconfigurable Cell Array), Cypres flash 370 device technology, Lattice pLSI's 3000series.

UNIT III

FPGAs: Field Programmable Gate Arrays – Logic blocks, routing architecture, Logic cells and features of commercially available FPGA's- XILINX XC4000, Virtexii FPGA's, XILINX SPARTAN II, Alteras Act1, Act2, Act3 FPGA's, Actel FPGA's, AMD FPGA.

UNIT IV

Finite State Machines (FSM): Top Down Design, State Transition Table , State assignments for FPGAs, Realization of state machine charts using PAL, FSM Architectures: Architectures Centered around non registered PLDs, Design of state machines centered around shift registers, One_Hot state machine, Petrinets for state machines-Basic concepts and properties, Finite State Machine-Case study.

UNIT V

System Level Design: Controller, data path designing, Functional partition, Digital front end digital design tools for FPGAs & ASICs, System level design using mentor graphics EDA tool (FPGA Advantage), Design flow using CPLDs and FPGAs.

Suggested Reading:

1. S. Trimberger, Edr, "Field Programmable Gate Array Technology", Kluwer Academic Pub., 1994.
2. Richard F.Tinder, "Engineering Digital Design", 2/e, Academic press
3. Charles H. Roth, "Fundamentals of logic design", 4/e, Jaico Publishing House.

References:

1. P.K.Chan & S. Mourad, "Digital Design Using Field Programmable Gate Array", PHI, 1994.
2. S. Brown, R.J.Francis, J.Rose, Z.G.Vranesic, "Field programmable gate array", BSP, 2007.
3. Manuals from Xilinx, Altera, AMD, Actel.

EC 354

Analog and Mixed IC Design

(Elective - I)

Instruction	4 Periods/week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Familiarization of current mirrors and their application in the design of Operational Amplifiers.
2. To study the various design issues of Op-Amps and their different architectures.
3. To study different types of data converter circuits.

Course Outcomes:

1. Able to gain the knowledge about various issues of Op-Amp design
2. Understand various other Op-Amp architectures
3. Students will be able to realize an A/D or D/A converter using current mirrors circuits.

UNIT I

Basic MOS Devices and Current Mirrors:

MOS Structure, I/V characteristics, MOS device models, Second Order Effects, Advanced MOS Modeling.

Simple CMOS current mirror, Common source amplifier, Source follower, Common gate stage, Source degenerated current mirror, High output impedance current mirrors, Cascode gain stage, Bipolar current mirrors, Bipolar gain stage, Frequency response of amplifiers.

UNIT II

Design of Op-Amp and its Frequency Response:

MOS Differential pair and gain stage, bi-polar differential pair and gain stage.

Operational Amplifiers: Two stage Op-Amps, Feedback and Op-amp Compensation, Common Mode Feedback, Input range limitation, Slew-rate, Power supply rejection, Multipole systems, Phase margin, Frequency compensation.

Advanced current mirrors, Folded Cascade Opamp, Current Mirror Opamp, Fully Differential Opamp, Current Feedback Opamp.

UNIT III

Design of Comparator and Switched Capacitor Circuits:

Use of Opamp for a Comparator, Charge Injection Error, Latched Comparators, CMOS Comparator and Bipolar Comparator.

Basic building blocks of switched capacitor, Basic Operation and Analysis, First order, Bi-quad, Charge Injection, Switched Capacitor Gain Circuit, Correlated Double Sampling Techniques, Other Switched Capacitor Circuits.

UNIT IV

S/H Circuits and Data Converters:

Sample and hold circuits: Performance and basics of sample and hold circuit, examples of CMOS, Bi-Polar sample and hold Circuits.

Converters: Ideal D/A converters, Ideal A/D converters, Quantization Noise, Signed codes, Performance limitations.

Nyquist Rate D/A Converters: Decoder based Converters, Binary scaled Converters, Thermometer code Converter -realization of converters using current mirrors.

UNIT V

Nyquist Rate A/D Data converters:

A/D Converters: Integrating Converter, Successive Approximation Converter, Cyclic A/D, Flash Converter, Two step A/D Converter, Interpolating A/D, Folding and Pipe-Lined, Time Interleaved Converters-realization of converters using current mirrors.

Text Books:

1. D.A John & Ken Martin, "Analog Integrated Circuit Design". John Wiley Publications, Reprint 2011.
2. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", Tata-McGraw Hill Publications,2002.

Suggested Reading:

1.Philip E. Allen & Douglas R. Holberg, "CMOS Analog Circuit Design", Oxford University Press, 2002

EC 355

SYSTEM AUTOMATION AND CONTROL

(Elective - I)

Instruction	4 Periods/week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks
Credits	3

Course objectives:

1. To learn the various sensors and transducers.
2. To study the data acquisition and signal conditioning modules.
3. To learn the concepts of motion control systems and robotics.

Course Outcomes:

1. Understand the various sensors and transducers.
2. Implement the data acquisition and signal conditioning modules.
3. Understand the concepts of motion control systems and robotics.

UNIT – I

Introduction to sensors and transducers: displacement, position, and proximity, velocity and motion, force, fluid pressure, liquid flow, liquid level, temperature, light. Selection of sensor.

UNIT – II

Data acquisition and Signal conditioning: various signal conditioning modules. Use of data acquisition. Fundamentals of Analog to digital conversion, sampling, amplifying, filtering, noise reduction. Criteria to choose suitable data acquisition equipment.

UNIT – III

Introduction to systems: Measurement and control. Basic system models. Mathematical models. Mechanical system building blocks, Electrical system building blocks, Fluid system building blocks and Thermal system building blocks. Engineering systems: Rotational – translational, Electromechanical, hydraulic-mechanical.

UNIT – IV

Dynamic responses of systems, system transfer functions, frequency response, closed loop controllers. Microcontroller basics, architecture, hardware interfacing, programming a microcontroller.
Programmable logic controllers: basic structure, input/output processing, programming, selection of a PLC.

UNIT – V

Motion control and robotics: concepts of motion control system and real world applications. Components of a motion control system. Motion controller, Motors and mechanical elements, move types, Motor amplifiers and drives. Feed back devices and motion input/output.

Suggested Reading:

1. W. Bolton, "Mechatronics: Electronic control systems in mechanical and electrical Engineering", 3/e, Pearson Education, 2008.
2. Robert A. Witte, "Electronic Test Instruments: Analog and Digital Measurements", 2/e, Pearson Education, 2002.
3. Dan Necsulescu, "Mechatronics", 1/e, Pearson Education, 2002.
4. De Silva, " Mechatronics", First Indian Reprint 2013, (Taylor & Francis), Yesdee Publications

SCHEME OF INSTRUCTION AND EXAMINATION
4/4 B.E
ELECTRONICS & COMMUNICATION ENGINEERING

SEMESTER – I

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 411	Radar Systems	4	-	3	75	25	3
2	EC 412	Data Communications and Computer Networks	4	-	3	75	25	3
3	EC 413	VLSI Design	4	-	3	75	25	3
4	EC 414	Electronic Instrumentation	4	-	3	75	25	3
5	ME 419	Industrial Administration and Financial Management	4	-	3	75	25	3
6	---	Elective -II	4	-	3	75	25	3
PRACTICALS								
7	EC 415	Electronic Design and Automation Lab	-	3	3	50	25	2
8	EC 416	Advanced Simulation Lab		3	3	50	25	2
9	EC 417	Project Seminar	-	3	3	--	25	1
		Total	**24**	**9**	**27**	**550**	**225**	**23**

L: Lecture, T: Tutorial, D: Drawing, P: Practical

S.No.	CODE	ELECTIVE – II
1	EC 461	Advances in Microwave Engineering
2	EC 462	Embedded Systems
3	EC 463	Neural Networks and Fuzzy Logic
4	EC 464	Satellite Communication
5	EC 465	DSP Processors Architectures
6	EC 466	Speech processing

EC 411

RADAR SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To learn the principles of operation of radar systems.
2. Be able to design and simulate radar systems.
3. Be able to know the various types of tracking radars.
4. Be able to understand various types of radar clutters.
5. Be able to know the various types of radar displays.

Course Outcomes:

Student will be able to:

1. Understand the principles of operation of pulse radar system.
2. Know the applications of CW and FMCW radar.
3. Understand the working principle of MTI and Pulse Doppler Radar and matched filter concepts.
4. Get familiarization of various radar clutters and Phased array antennas.
5. Compare various tracking radars along with their advantages and disadvantages.
6. Understand various radar displays and radar receiver.

UNIT-I

Introduction to radar, radar block diagram and operation, radar frequencies, Applications of radar, Prediction of range performance, minimum detectable signal, receiver noise, probability density function, SNR, Integration of radar pulses, radar cross-section of targets, PRF and range ambiguities, transmitter power, system losses.

UNIT-II

Doppler effect, CW radar, FM CW radar, multiple frequency CW radar. MTI radar, delay line canceller, range gated MTI radar, blind speeds, staggered PRF, limitations to the performance of MTI radar, non-coherent MTI radar.

UNIT-III

Tracking radar: sequential lobing, conical scan, monopulse: amplitude comparison and phase comparison methods, Low angle tracking, tracking in range, comparison of various trackers, Radar antennas.

UNIT-IV

Radar Clutter: Introduction to radar clutter, surface clutter radar equation, Land clutter, Sea clutter, statistical models for surface clutter, detection of targets in clutter, Phased array Antennas.

UNIT-V

Radar receiver**:** The radar receiver, receiver noise figure, Super heterodyne receiver, importance of Matched filter, Duplexers and receiver protectors, Radar Displays.

Text Books:

1. Merril. I. Skolnik, "Introduction to Radar Systems", 2/e, MGH, 2001.
2. Mark A. Richards, James A. Scheer and William A. Holm, "Principles of Modern Radar: Basic Principles," YesDee Publishing Pvt. Ltd., India, 2012.

Suggested Reading:

1. Byron Edde, "Radar: Principles, Technology, Applications", Pearson, 2008
2. G.S.N Raju, "Radar Engineering And Fundamentals Of Navigational Aids", I.K. International publishing house Pvt. Ltd., 2010.

EC 412

DATA COMMUNICATION AND COMPUTER NETWORKS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To provide a conceptual foundation for the study of data communications using the open Systems interconnect (OSI) model for layered architecture.
2. To study the principles of network protocols and internetworking
3. To understand the Network security and Internet applications.
4. To understand the concepts of switched communication networks.
5. To understand the performance of data link layer protocols for error and flow control.
6. To understand various routing protocols.

Course Outcomes:

After completing this course the students will be able to:

1. Identify different tasks of computer communications networks and protocol architectures.
2. Analyze and compare circuit switching and packet switching concepts and understands ATM network concepts.
3. Analyze the performance of various Data link control protocols for flow control and error control.
4. Analyze the services and functions of the networks layer and recognize the different internetworking devices and their functions.
5. Understand how routing is carried out in large open networking environment and the operations of major internet routing protocols such as ICMP, ARP,OSPF and BGP.
6. Understand the importance of basic network security measures such as encryption, Authentication protocols and study standard Internet applications protocols.

UNIT-I

Introduction:
Data Communications and Networking for Today's Enterprise, A Communications Model, Data Communications, Networks. The Need for Protocol Architecture and Standardization, the TCP/IP Protocol Architecture, the OSI reference Model, Line Configurations. Basic concepts of networking. Network topologies. Types of Network: LAN, MAN, WAN.

UNIT-II

Switched Communications Networks: Circuit-Switching Networks, Circuit-Switching Concepts Soft switch Architecture, Packet-Switching Principles, X.25, Frame relay. ATM Networks-Protocol Architecture, ATM Logical Connections, ATM Cells, Transmission of ATM Cells, and ATM Service Categories.

UNIT-III

Data Link layer: Design issues, Services provided to the Network layer, framing, Error Control, Flow Control. Elementary Data Link Control Protocols**:** Stop and Wait, Sliding Window, Go Back-N, Selective Repeat. High-Level Data Link Control (HDLC).
MAC Sub Layer: Multiple Access Protocols: ALOHA, CSMA, Comparison of IEEE Standards IEEE 802.3, 802.4, 802.11, 802.15, 802.16.

UNIT-IV

Network Layer: Network Layer Design Issues, Routing algorithms: Shortest Path Routing, Flooding, Distance Vector Routing, Hierarchical routing, Broadcast, Multicast, Congestion Control- Congestion Control Algorithms. Quality of service. Internet Working. The Network Layer in Internet-IP Version 4 protocol, IP Addressing, Comparison of IPV4 and IP V6, Internet Control Protocols-ICMP, ARP, OSPF and BGP.

UNIT-V

Transport Protocols: The transport Service, Elements of Transport Layer, TCP and UDP protocol header formats.
Network Security and Internet Applications: Cryptography techniques, Authentication Protocols. Applications layer protocols: Domain Name System, SNMP, Electronic Mail, and World Wide Web.

Textbooks:

1. W. Stallings, "Data and Computer Communications", eight Edition, Prentice Hall -2007
2. A. Tanenbaum and D. Wetherall, "Computer Networks", fifth Edition, Prentice-Hall, 2011.

Suggested Reading:

1. Behrouz A. Forouzan, "Data Communications and Networking", Fourth Edition. McGraw-Hill Forouzan Networking Series, McGraw-Hill, 2007
2. S. Keshav, "An Engineering Approach to Computer Networks", Second Edition, Addison-Wesley Professional Pearson Education, 2001

EC 413

VLSI DESIGN

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To study the basic concepts of verilog HDL.
2. To learn the various abstraction levels in verilog HDL.
3. To understand simulation and synthesis process/concepts.
4. To learn the various characteristics of MOS transistor.
5. To learn the various concepts required to obtain the digital logic layout diagrams.
6. To learn various subsystem design concepts.

Course Outcomes:

The student will be able to

1. Design and simulate various combinational and sequential logic circuits using verilog HDL
2. To simulate and synthesize digital logic designs.
3. Understand characteristic behaviour of MOSFET and layout desig rules.
4. Design CMOS based logic circuits.
5. Understand the design concepts of memories.
6. Understand the concepts of VLSI testing.

UNIT - I

Introduction to HDLs, Basic Concepts of Verilog, Data Types, System Tasks and Compiler Directives. Gate Level Modeling: Gate Types and Gate Delays. Dataflow Modeling: Continuous Assignment and Delays. Design of Stimulus Block.

UNIT - II

Behavioural Modeling: Structured Procedures, Procedural Assignments, Timing control, Conditional statements, Sequential and Parallel Blocks. Switch level Modeling.UDP. Design of Mealy and Moore state models using Verilog. Logic Synthesis, Synthesis Design flow, Gate level Netlist.

UNIT - III

Introduction to MOS Technology, Basic MOS Transistor action: Enhancement and Depletion Modes. Basic electrical properties of MOS. Threshold voltage and Body Effect. MOS and CMOS circuit Design Process: MOS Layers, Stick diagrams, Lambda based Design rules and Layout diagrams.

UNIT – IV

Design of MOS inverters with different loads. Basic Logic Gates with CMOS: INVERTER, NAND, NOR, AOI and OAI gates. Transmission gate logic circuits, BiCMOS inverter, D flip flop using Transmission gates.

UNIT - V

Subsystem Design: Multiplexor, Comparator, Shifters, Programmable Logic Arrays.

Memories: Design of Dynamic Register Element, 3T, 1T Dynamic RAM Cell, 6T Static RAM Cell. NOR and NAND based ROM Memory Design.

Testing: Introduction to Testing, Fault models, Controllability, Observability.

Text Books:

1. Samir Palnitkar, "Verilog HDL: A guide to Digital design and synthesis", 2/e , Pearson Education, 2008.
2. Kamran Eshraghian, Douglas A. Pucknell, Sholeh Eshraghian, "Essentials of VLSI circuits and systems", PHI, 2011.
3. Neil H E Weste, David Harris, Ayan Banerjee "CMOC VLSI Design –A circuit and System Perspective", 3/e, Pearson Education, 2006.

Suggested Reading:

1. Michael D. Ciletti, "Advanced Digital Design with Verilog HDL", PHI, 2005.
2. John P. Uyemura, "Introduction to VLSI Circuits and systems", John Wiley & Sons, 2011.

EC 414

ELECTRONIC INSTRUMENTATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To impart a basic knowledge of International Standards for various physical quantities
2. To provide a basic understanding of measurement systems and an in-depth understanding of measurement errors.
3. To expose the students to the many varieties of transducers and measuring instruments, their operating principles, construction.
4. To provide an idea of the strengths and weaknesses of various types of sensors and transducers
5. To introduce students to various types of spectrum analyzers, virtual instrumentation techniques and their applications
6. To provide the students a basic exposure to some of the prominent bio-medical instrumentation systems

Course Outcomes:

Students will be able to:

1. Perform accurate measurements for any engineering system with clear idea of the potential errors
2. Know several important standards related to measurements and quality management
3. Select the appropriate passive or active transducers for measurement of physical phenomenon
4. Understand the operating principles of various types of transducers used to measure temperature, displacement, and other physical quantities.
5. Use instruments like spectrum analyzer, DSO and other virtual instrumentation techniques for appropriate measurements.
6. Understand the fundamentals of various Biomedical instrumentation systems

UNIT– I

Accuracy, Precision, Resolution and Sensitivity. Errors and their types. Calibration. Standards of measurement, classification of standards, IEEE standards, Elements of ISO 9001, Quality management standards.

UNIT – II

Classification of transducers, factors for selection of a transducer, transducers for measurement of velocity, force, Hot wire anemometer. Passive electrical transducers- Strain gauges - gauge

factor types of strain gauges: rosettes, semiconductor stain gauges and strain measurement, LVDT-construction and displacement measurement, capacitive transducer and thickness measurement. Active electrical transducers: Piezo-electric, photo-conductive, photo-voltaic and photo-emissive transducers.

UNIT – III

Characteristics of sound, pressure, power and intensity levels. Microphones and their types. Temperature measurement, resistance wire thermometers, semiconductor thermometers and thermocouples. Humidity measurement, resistive capacitive, aluminum oxide and crystal Hygrometer types. Introduction to Micro-Electro-Mechanical Systems (MEMS).

UNIT – IV

Block diagram, specification and design considerations of different types of DVMs. Spectrum analyzers. Delayed time base oscilloscope, Digital storage oscilloscope. Introduction to Virtual Instrumentation, SCADA. Data Acquisition System- block diagram

UNIT – V

Human physiological systems and related concepts. Bio-potential electrodes Bio-potential recorders - ECG, EEG, EMG and CT scanners, magnetic resonance and imaging systems, Ultrasonic Imaging systems.

Text Books:

1. Albert D. Helfric, and William D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 2010.
2. H S Kalsi, "Electronic Instrumentation", 3/e, TMH, 2011.
3. Nakra B.C, and Chaudhry K.K., "Instrumentation, Measurement and Analysis", TMH, 2004

Suggested Readings:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.
2. Khandpur. R.S., "Handbook of Bio-Medical Instrumentation", TMH, 2003.
3. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980.

ME 419

INDUSTRIAL ADMINISTRATION AND FINANCIAL MANAGEMENT

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

1. To make the students understand the roll importance and functions of Management in Industrial Organization
2. To make the students understand various types of business organizations and organization structures.
3. To make the students understand importance of plant location and plant layout
4. To ensure that the students understand the importance of industrial engineering students like method study and work measurement.
5. To make the students understand the importance of project management techniques
6. To make the students calculate the total cost of a product based on elements of cost

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

1. Understand the role and importance of management and its principles.
2. Understand the need and importance of various types of layouts used in manufacturing industries
3. Apply the techniques of method study and work measurement in industry to enhance productivity
4. Apply the techniques of project management in industry
5. Understand the importance of quality control and plot the control charts

6.Calculate the total cost of the product based on its elements.

UNIT-I

Industrial Organization: Definition of an organization, types of various business organizations, organization structures and their relative merits and demerits, functions of management.
Plant location and layouts: Factors affecting the location of plant and layout, types of layouts and their merits and demerits.

UNIT-II

Work study: Definitions, objectives of method study and time study, steps in conducting method study, symbols and charts used in method study, principles of motion economy,

calculation of standard time by time study and work sampling, performance rating factor, types of ratings, jobs evaluation and performance appraisal, wages, incentives, bonus, wage payment plans

UNIT-III

Inspection and quality control: Types and objectives of inspection, S.Q.C., its principles. Quality control chart and sampling plans, quality circles, introduction to ISO.

Production planning and control: Types of manufacture, types of production, principles of PPC and its function, production control charts.

UNIT-IV

Optimization: Introduction to linear programming and graphical solutions, assignment problems.

Project Management: Introduction to CPM and PERT, determination of critical path.

Material Management: Classification of materials, materials planning, duties of purchase manager, determination of economic ordering quantities, types of materials purchase.

UNIT-V

Cost accounting: Elements of cost, various costs, types of overheads, break even analysis and its applications, depreciation, methods of calculating depreciation fund, nature of financial management, time value of money, techniques of capital budgeting and methods, cost of capital, financial leverage.

Text Books:

1. Pandey I.M. , Elements of Financial Management, Vikas Publ. House, New Delhi, 1994
2. James C Van Horne, John M Wachowicz, Jr., "Fundamentals of Financial Management", 13th edition, Prentice Hall Financial Times.
3. Khanna O.P., Industrial Engineering and Management, Dhanapat Rai & Sons

Suggested Reading:

1. S.N. Chary, Production and Operations Management, Tata McGraw Hill, 3rd Edition, 2006.
2. Paneer Selvam, Production and Operations Management, Pearson Education, 2007.
3. Joseph Monk, Operations Management, TMH Publishers, New Delhi, 2004.
4. Buffa Elwood S, Modern Production /Operations Management , John Wiley Publishers, Singapore, 2002
5. Everrete E. Adama & Ronald J. Ebert, Production & Operations Management, Prentice Hall of India, 5th Edition, 2005.
6. S.D. Sharma, "Operations Research", Kedarnath, Ramnath & Co., Meerut,2009

EC 415

ELECTRONIC DESIGN AND AUTOMATION LAB

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To simulate and synthesize combinational logic circuits
2. To simulate and synthesize sequential logic circuits
3. To obtain RTL schematic
4. To simulate switch level modules
5. To learn implement procedure for any design on FPGA
6. To study the speed, power and area constraints of FPGA/CPLD

Course Outcomes:

The student will be able to

1. Simulate and synthesize combinational logic circuits
2. Simulate and synthesize sequential logic circuits
3. Obtain gate level net-list and RTL diagrams
4. Implement sequence detector using FSM on FPGA
5. Implement mini projects on FPGA/CPLD
6. Design adder using UDP

Part A

Write the Code using VERILOG, Simulate and synthesize the following

1. Arithmetic Units: Adders and Subtractors.
2. Multiplexers and De-multiplexers.
3. Encoders, Decoders, Priority Encoder and Comparator.
4. Implementation of logic function using Multiplexers and Decoders.
5. Arithmetic and Logic Unit with minimum of eight instructions.
6. Flip-Flops.
7. Registers/Counters.
8. Sequence Detector using Mealy and Moore type state machines.
9. Implementation of any application of UDP.

Note:-

1. All the codes should be implemented appropriately using Gate level, Dataflow and Behavioral Modeling.
2. All the programs should be simulated using test benches.
3. Minimum of two experiments to be implemented on FPGA/CPLD boards.

Part B

Switch Level modeling of CMOS circuits

1. Basic Logic Gates: Inverter, NAND and NOR.
2. Half Adder and Half Subtractor.
3. 4:1 Multiplexer.
4. 2:4 Decoder.
5. Design of any basic circuit using CADENCE tool.

Mini project:

i) Design a 8-bit CPU.
ii) Generation of different waveforms using DAC.
iii) RTL code for Booth's algorithm for signed binary number multiplication.
iv) Development of HDL code for MAC unit and realization of FIR Filter.
v) Design of 4-bit thermometer to Binary Code Converter.

EC 416

ADVANCED SIMULATION LAB

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

LAB EXPERIMENTS

1. Familiarization with simulation tools like LabVIEW and Network Simulator2 (NS2)
2. Working with loops, Structures and Mathscripts
3. (a) Combinational circuits(Adders , Substractors , Mux , Demux, Decoder and Encoder)
   (b) Sequential circuits (Flip flops, counters and registers)
4. (a) Convolution and correlation of signals
   (b) Filters (FIR and IIR)
5. (a) Analog modulation and demodulation schemes(AM and FM)
   (b) Digital carrier modulation and demodulation schemes (ASK and FSK)
6. (a) Time domain analysis (State variable analysis)
   (b) Frequency domain analysis (Nquist and Bode plots)
7. Study of basic features and functions of RTOS (VxWorks)
8. VxWorks Task function programming
9. VxWorks Timer programming
10. VxWorks IPC Programming-I
    (a) Signals
    (b) Semaphores
11. VxWorks IPC Programming-II
    (a) Message Queques
    (b) Mail boxes
12. Creation of a network with at least four nodes.
13. Transmission between the nodes in a network.
14. Simulation of the data transfer between the nodes using TCP

Mini Project cum Design Exercise(s).

Design and development of any one of the following applications.

(a) Digital IIR Notch filter
(b) Multistage design of decimator and interpolator
(c) Discrete multitone transmitter and receiver
(d) ALU
(e) Universal shift registers
(f) Code converters
(g) PLL
(h) Implementation of the Real time scheduling algorithms

EC 417

PROJECT SEMINAR

Instruction	3L Periods per week
Sessionals	25 Marks
Credits	1

The objective of the project seminar is to actively involve the student in the initial work required to undertake the final year project. Dealing with a real time problem should be the focus of the under graduate project.

It may comprise of

- Problem definition and specifications.
- A broad understanding of the available techniques to solve a problem of interest.
- Presentation (Oral & written) of the project.

The department should appoint a project coordinator who will coordinate the following.

- Grouping of students as project batch(a maximum of 3 in group)
- Allotment of projects and project guides
- Project monitoring at regular intervals.

Each project group/batch is required to

1. Submit a one page synopsis of the seminar to be delivered for display on notice board.
2. Give a 30-40 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write up on the talk delivered.

Three (3) teachers will be associated with the evaluation of the project seminar for the award of the sessional marks which should be on the basis of performance on all the three items stated above.

EC 461

ADVANCES IN MICROWAVE ENGINEERING
(Elective-II)

Instruction	4 periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To prepare students to understand the impedance matching with reactive elements.
2. To understand strip lines and microwave integrated circuits.
3. To understand advanced microwave amplifiers, oscillators and boundary values.
4. To understand the concept of microwave filters.
5. To understand the various microwave matching elements.
6. To understand the basis and test functions.

Course Outcomes: The students will be able to

1. Understand fabrication of passive components and analysis of couplers and MIC's.
2. Analysis of couplers.
3. Familiar with impedance matching techniques.
4. Design single stage amplifiers.
5. Design microwave filters using two methods.
6. Understand analysis methods at microwave frequencies.

Unit-I

Microwave integrated circuits-Introduction, circuit forms, Transmission lines for MICs, materials, fabrication, hybrid MIC’s, lumped inductor, capacitor and resistor, advantages and difficulties with MIC’s.

Strip line, Geometry of enclosed strip line, Microstrip lines- field configuration, losses in lines, quality factor. Coupled line directional couplers, branch line couplers, TEM directional couplers.

Unit-II

Impedance Matching with Reactive Elements: Single stub, double stub and triple stub, waveguide reactive elements, quarter wav transformers, theory of small reflections , approximate theory of multisection quarter, wave transformers, binomial and chebyshev transformers, tapered transmission lines.

Unit-III

Design of microwave amplifiers and oscillators - Characteristics of microwave transistor, microwave bipolar transistor, gain and stability, single stage transistor amplifier design , transistor oscillator, Parametric amplifiers.

Unit-IV

Microwave Filters: Introduction of Microwave Filters, Image parameter method of filter design, Filter design by Insertion loss method, specification of power loss ratio.

Unit-V

Techniques for solving EM boundary value problems (elementary treatment only) – Full wave analysis, frequency and time domain analysis, differential and integral equation method, method of moments(MOM), choice of basis and test functions.

Text Books:

1. David M. Pozar, “Microwave Engineering”, 4/e, Wiley student edition, 2012.
2. Ramesh Garg, Prakash Bhartia, Inder Bahl and Apisak Ittipiboon, “ Microstrip Antenna Design Hand Book”, Chapter 2, Artech House 2001.

Suggested Reading:

1. R.E. Collins, “Foundations for Microwave Engineering”, 2/e, John Wiley & Sons, 2003.
2. Om.P. Gandhi, “Microwave Engineering and Applications”, Maxwell Macmillan International editions,1991.
3. Constantine A. Balanis, "Antenna Theory: Analysis and Design", 4th Edition, Wiley, January 2016.

EC 462

EMBEDDED SYSTEMS

(Elective - II)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To learn about fundamentals of the embedded system design
2. To understand the hardware and software details of the embedded systems.
3. To acquire knowledge on the serial, parallel and network communication protocols.
4. To understand the embedded system design life cycle and co-design issues.
5. To learn about the various embedded software development tools.
6. To design the embedded system for various applications.

Course Outcomes:

Student will be able to

1. Know the fundamentals of the embedded systems
2. Know the hardware and software details of the embedded systems.
3. Interface serial, parallel and network communication protocols to embedded systems
4. Know the embedded system design life cycle and co-design issues.
5. Analyze the various embedded system applications
6. Develop the various embedded system applications

UNIT – I

Introduction To Embedded Systems: Embedded systems Vs General Computing Systems, History of embedded systems, classifications, applications areas, characteristics and quality attributes of embedded systems, Design metrics and challenges in embedded system design.

UNIT – II

Embedded Hardware and Software: Processor embedded into a system, Processor selection for embedded system, embedded hardware units and devices in a system, embedded software in a system and an overview of programming languages, challenges and issues related to embedded software development.

UNIT – III

Communication protocols: I^2C, CAN, USB, Firewire-IEEE 1394 Bus standard, Advanced serial high speed buses. Parallel Bus device protocols: ISA, PCI, PCI-X , ARM Bus, Advanced parallel high speed buses. Internet Enabled Systems-Network protocols: HTTP, TCP/IP, Ethernet. Wireless and mobile system protocols

UNIT – IV

Embedded System design and co-design issues in system development process, Design cycle in the development phase for an Embedded Systems. Embedded software development tools: Host and Target Machines, Linker/Locators for embedded software, Embedded Software into the Target system. Issues in hardware and software design and co-design

UNIT – V

Integration and testing of embedded hardware, testing methods, debugging techniques, Laboratory tools and target hardware debugging: Logic Analyzer, simulator, emulator and In-circuit emulator, IDE, RTOS Characteristics, Case Study: Embedded Systems design for automatic vending machines and digital camera.

Text Books:

1. Raj Kamal, "Embedded Systems-Architecture, Programming and Design," 3/e, Tata McGraw Hill Education, 2015.
2. Shibu K V, "Introduction to Embedded systems", 1/e, McGraw Hill Education, 2009.
3. Frank Vahid and Tony Givargis, "Embedded System Design: A Unified Hardware/Software Approach, 1999.

Suggested Reading:

1. David E.Simon, "An Embedded software primer", Pearson Education, 2004.
2. Embedded System Design : A Unified Hardware/ Software Introduction, 1/e, Wiley, John & Sons.

EC 463

NEURAL NETWORKS AND FUZZY LOGIC

(Elective-II)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To introduce different architectures of neural network.
2. Apriciate some of the models describing neural networks.
3. Familiarize with some Application of Neural Networks.
4. Deriving basic concepts of fuzzy logic in systems.
5. Modeling of systems using fuzzy logic and fuzzy operators.
6. Implementation of Fuzzy Logic Controllers and to explore the use of neuro fuzzy controllers.

Course Outcomes:

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

1. Comprehend the concepts of feed forward neural networks.
2. Analyze the various feedback networks and neural controllers.
3. Appreciate the concept of fuzziness involved in various systems and fuzzy set theory.
4. Comprehend the Fuzzy logic control and adaptive fuzzy logic.
5. Have a broad knowledge in developing the different algorithms for neural networks.
6. Analyze the application of neuro fuzzy logic control to real time systems.

UNIT-I

Introduction to Artificial Neural Networks and Concepts

Neuron physiology, Neuronal Diversity, specifications of the Brain, Neural Attributes, Modeling, Basic Model of a Neuron, Learning in Artificial Neural Networks, Characteristics of ANNs, Important ANN Parameters, Artificial Neural Network Topologies, Learning Algorithms, Discrimination Ability.

UNIT-II

Neural Network Paradigms

Mcculloch-Pitts Model, The Perceptron, ADALINE and MADALINE Models, Back propagation learning Algorithm, cerebellum Model Articulation Controllers(CMAC),Adaptive Resonance Theory(ART) Paradigm, Hopfield Model, LAM, Real-Time Models, LVQ, SOM

UNIT-III

Fuzzy Logic

Propagation logic, The Membership Function, Fuzzy Logic, Fuzzy Rule Generation, Defuzzification of Fuzzy Logic, Time -dependent Fuzzy Logic, Temporary Fuzzy Logic (TFL), Applying Temporal Fuzzy Operators, Defuzzification of Temporal Fuzzy Logic, Examples: Applicability of TFL in Communications Systems.

UNIT-IV

Fuzzy Neural Networks

Fuzzy Artificial Neural Networks (FANN), Fuzzy Neural Example: Neuro-Fuzzy control, Fuzzy Neural Nets-A Reality.

UNIT-V

Applications Of FLC

Signal Processing, Image Data Processing, Communications Systems, Intelligent Control, Optimization Techniques, Other Applications.

Text books:

1. Stamatios V.Kartalopoulos," Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications", Wiley IEEE Press, New Delhi, 2004.
2. Kosko. B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", PHI, New Delhi, 2008.

Suggested Reading:

1. Simon Haykin,"Neural Networks: A Compressive Foundation", Pearson,New Delhi, 2005.
2. J.S.R.Jang, C.T.Sun, E.Mizutani,"Neuro-Fuzzy and Softcomputing": A Computational approach to learning and machine intelligence, PHI, New Delhi, 2012.

EC 464

SATELLITE COMMUNICATION
(Elective - II)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives:

1. To develop awareness about satellite communication system architecture and satellite orbits.
2. To acquire the knowledge about orbital effects and mechanics of launching a satellite.
3. Study of various satellite subsystems.
4. To design a satellite link considering different parameters like noise and losses.
5. To familiarize with the satellite applications.

Course outcomes:

Student will be able to:

1. Understand the development history and applications of satellite systems
2. Know the orbital effects and mechanics of launching a satellite would be understood by the student.
3. Analyze the various Satellite subsystems.
4. Understand the role and importance of a satellite transponder.
5. Analyze the link budget of a satellite link for specified C/N ratios.
6. Know the applications of satellite like VSAT and DBS.

UNIT-I

Introduction of satellite communications

Brief history of satellite communications, Block diagram of earth segment and space segment, Brief introduction of Indian scenario in communication satellites.

Orbital aspects of Satellite Communication

Introduction to geo-synchronous and geo- stationary satellites, Kepler's laws (statements and explanation only), applications of satellite communications.

UNIT-II

Orbital Mechanics and Launchers

Orbital elements, Locating the satellite with respect to the earth, sub- satellite point, look angles, Orbital effects in communication system performance, Orbital perturbations, mechanics of launching a synchronous satellite.

UNIT-III

Satellite sub-systems

Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system, Communications subsystems (transponders), Space craft antennas, multiple access techniques, comparison of FDMA, TDMA, CDMA.

UNIT-IV

Introduction to satellite link design, considerations for design of satellite system, basic transmission theory, system noise temperature and G/T ratio, design of down link and uplink, design of satellite links for specified C/N, overall C/N for uplink and downlink.

UNIT-V

Introduction to Direct Broadcast Satellite Television

C band and Ku band home satellite TV, Block diagram of Digital DBS TV Overview of VSAT systems, VSAT network architecture, One way and two way implementation.

Text Books

1. Timothy Pratt and Charles W Bostian,Jeremy E.Allnutt, "Satellite Communications", 2/e, John Wiley, 1986.
2. Dennis Roddy "Satellite Communications", Fourth edition", Mc Graw Hill, 2006.

Suggested Reading:

1. 1. M. Richharia, "Satellite Communication Systems: Design Principles", Mc Graw Hill, 2/e, 2003.

EC 465

DSP PROCESSORS ARCHITECTURES
(Elective - II)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Prerequisite: Course on Digital Signal Processing**.**

Course Objectives:

1. To learn the architectural differences between DSP and General purpose processor.
2. To study the fixed point and floating point DSP Processors.
3. To study the various application of DSP Processors.

Course Outcomes:

Student will able to

1. Differentiate between DSP Processor and General Purpose processor.
2. Implement various number formats on DSP processors.
3. Understand the various parallel processing architectures.
4. Interface the TMS320C54XXarchitecture to peripherals.
5. Interface the TMS320C67XX architecture to peripherals.
6. Design and implement various signal processing algorithms on DSP processors.

UNIT- I

Introduction to DSP Processors

Differences between DSP and other micro processor architectures.

Number formats- Fixed point, Floating point and block Floating point formats, IEEE-754 Floating point, Dynamic range and precision, Relation between data word size and instruction word size, Q-notation.

UNIT-II

Fundamentals of Programmable DSPs

Multiplier and Multiplier Accumulator, Modified Bus structures and memory access in PDSPs – Multiple access memory, multiport memory, SIMD, VLIW Architectures, Pipelining, Special addressing modes in PDSPs, On-chip peripherals.

UNIT-III

Overview of TMS320C54XX

Types of Fixed point DSPs, Architecture of TMS320C54XX Processor, addressing modes, Instructions set, Pipelining and on-chip peripherals.

UNIT-IV

Overview of TMS320C67XX

Types of Floating point DSPs, Architecture of TMS320C67XX Processor, addressing modes, Instructions set, Pipelining and on-chip peripherals.

UNIT-V

Applications of DSP Processor

Implementation of algorithms on DSP processors - convolution, correlation, FFT, FIR filter, IIR filter, Decimation and Interpolation and subband coding of signals.

Text Books:

1. Avatar Singh and S. Srinivasan, "Digital Signal Processing Implementations Using DSP Microprocessors", Thomson Brooks, 2012.
2. B. Ventakaramani, M. Bhaskar, "Digital Signal Processors Architecture Programming and Applications", Tata Mc Graw Hill, 2006.

Suggested Readings:

1. Sen M. Kuo&WoonSergGan, "Digital Signal Processors Architectures, Implementation and Application", Pearson Practice Hall, 2013.
2. RulphChassaing, "Digital Signal Processing and Application with the C6713 and C6416 DSK", A John Wiley & sons, Inc, Publication, 2005.

EC 466

SPEECH PROCESSING

(Elective - II)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To provide students with the knowledge of basic characteristics of speech signal in relation to production and hearing of speech by humans.
2. To describe basic algorithms of speech analysis and pitch extraction.
3. To give an overview of applications like text to speech conversion.
4. To give an idea of coding and decoding applications in speech signal processing.
5. To learn the various algorithms for speech recognition like HMM and Dynamic warping.

Course Outcomes:

Student will be able to:

1. Understand the basic characteristics of speech signal in relation to production and hearing of speech by humans.
2. Know the basic algorithms of speech analysis.
3. Analyze speech and extract features for speech applications.
4. Design the various applications like recognition, synthesis, and coding of speech.
5. Use HMM for speech recognition.
6. Implement Dynamic warping technique in real time problems.

UNIT – I

Fundamentals of Digital speech processing: Discrete time signals and systems, Transform representation of signals and systems (Z-transform, FT and DFT), fundamentals of digital filters (IIR and FIR), Sampling theorem. Decimation and interpolation of sampled waveforms, Mechanism of speech production.

UNIT - II

Time domain models of speech processing: Time dependent processing of speech, Short –time Energy and average magnitude, short time average Zero crossing rate, Speech Vs Silence Discrimination using Energy and Zero crossing, Pitch period estimation, short time auto correlation estimation, Short time average magnitude difference fuction, pitch period estimation, median smoothing and speech processing.

UNIT – III

Digital representation of the speech waveform: Sampling speech signals, review of statistical model of speech signal, Instantaneous Quantization, Adaptive Quantization, Differential quantization, Delta modulation, Differential PCM, Comparison of systems, LDM to PCM conversion and PCM to ADPCM conversion.

UNIT-IV

Homomorphic speech processing: Introduction, Homomorphic systems for convolution - properties of the complex Cepstrum, computational considerations, complex cepstrum of speech, Pitch detection, Formant estimation, The homomorphic Vocoder. Introduction to Text-to-speech and Articulator speech synthesis.

UNIT-V

Basic principle of Linear predictive Analysis, Solution ofthe LPC equations, Comparisions between the methods of the solutions of LPC Analysis equations, Frequencyy Domain interpretation of LPA, Applications of the LPC parameters Speaker recognition systems, Problems in Automatic speech recognition, Dynamic warping, Hidden Markow models, speaker Identification / verification.

Text Books

1. Rabiner L.R and Schafer R .W, "Digital Processing of Speech Signals", PHI, 1978.
2. Owens F.J., "Signal Processing of Speech", Macmillan, New Electronics, 1/e, 2000.

Suggested Reading:

1. Daniel Jurefsky & James H. Martin, "Speech and Language Processing", PHI, 2/e, 2003.
2. Papamchalis, "Practical Approaches to speech coding", PHI, 1987.

SCHEME OF INSTRUCTION AND EXAMINATION
4/4 B.E.
ELECTRONICS & COMMUNICATION ENGINEERING
SEMESTER – II

S.No.	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination			
			Periods per week		Duration in Hours	Maximum Marks		Credits
			L	T/D/P		Univ. Exam	Sessionals	
THEORY								
1	EC 421	GPS and Augmentation systems	4	-	3	75	25	3
2	EC	Elective -III	4	-	3	75	25	3
3	--	Open Elective	4	-	3	75	25	3
PRACTICALS								
4	EC 422	Seminar	-	3	-	-	25	1
5	EC 901	Project	-	6	Viva	100	50	9
Total			**12**	**9**	**9**	**225**	**150**	**19**

L: Lecture, T: Tutorial, D: Drawing, P: Practical

S.No.	**CODE**	**ELECTIVE – III**	**S.No.**	**CODE**	**Open Electives**
1	EC 471	Design of Fault Tolerant Systems	1	CS 486	JAVA Programming
2	EC 472	Real Time Operating System	2	ME 464	Entrepreneurship
3	EC 473	Elements of Software Defined Radio	3	CE 422	Disaster Mitigation and Management
4	EC 474	Wireless Sensor Networks	4	ME 472	Intellectual Property Rights
5	EC 475	Digital Image Processing	5	ME 555	Human Rights and Legislative Procedure
6	EC 476	Spectral Estimation Techniques	6	EC 481	Nano Technology
7	EC 477	Electromagnetic Interference and Electromagnetic Compatability(EMI & EMC)	7	IT 428	Network Security
			8	CS 411	Artificial Intelligence
			9	IT 429	Internet of Things

EC 421

GPS AND AUGMENTATION SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Prerequisite: A prior knowledge of satellite communication and Radio Navigation Aids is required.

Course Objectives:

1. To explain the basic principle of GPS and its operation.
2. To make the students to understand signal structure, errors, coordinate systems
3. To make the students understand the GPS navigation and observation files and compute the position.
4. Highlight the importance of integrating GPS with other systems.
5. To demonstrate the principle of DGPS and to facilitate the various augmentation systems.
6. To make the students appriciate the signaificance of augmentaion systems.

Course Outcomes:

Student will be able to:

1. Understand the principle and operation of GPS.
2. Frame various coordinate systems for estimating position.
3. Estimate the various errors and their effect on position estimation.
4. Compute user position from Navigation and Observation data formats.
5. Use GPS in various fields such as navigation, GIS etc.
6. Apply DGPS principle and can also analyze various augmentation systems.

UNIT-I

GPS fundamentals

GPS Constellation, Principle of operation, GPS orbits, Orbital mechanics and Satellite position determination, Time references. Dilution of precision: HDOP, VDOP, PDOP & GDOP.

UNIT-II

Coordinate systems

Geometry of ellipsoid, geodetic reference system, Geoid and Ellipsoid and Regional datum. World Geodetic System (WGS-84), Indian Geodetic System (IGS), Earth Centered Inertial (ECI), Earth Centered Earth Fixed (ECEF).

Various error sources in GPS: Satellite and Receiver clock errors, ephemeris error, Multipath error, atmospheric errors, the receiver measurement noise and UERE.

UNIT-III

GPS measurements

GPS signal structure, SPS and PPS services, C/A and P-code and carrier phase measurement, position estimation with pseudo range measurement, Spoofing and anti-Spoofing, GPS navigation and observation data formats.

UNIT-IV

GPS Applications

Surveying Mapping Marine, air and land Navigation, Military and Space Application. GPS Integration with Geographic Information System (GIS), Inertial Navigation System (INS), Pseudolite and Cellular. Indian Regional Navigation Satellite System (IRNSS).

Differential GPS (DGPS): Principle of DGPS, Types of DGPS: Local Area DGPS (LADPS), Wide Area DGPS (WADGPS).

UNIT-V

GPS Augmentation systems:

Need for augmentation, RNP parameters. Types of augmentation systems: Satellite Based Augmentation system (SBAS): Wide Area Augmentation System (WAAS), GPS Aided GEO Augmented Navigation (GAGAN). Ground Based Augmentation System (GBAS): Local Area Augmentation System (LAAS).

Text Books:

1. Ahmed El-Rabbany, “Introduction to GPS”, Artech House Publishers, 2/e, Boston 2006.
2. Elliot D Kaplan and Christopher J Hegarty,”Understanding GPS principles and applications”, Artech House Publishers, 2/e Boston & London 2005.

Suggested Reading:

1. B.Hofmann-Wellenhof, H.Lichtenegger, and J.Collins, “GPS Theory and Practice,” Springer Verlog, 5/e, 2008.
2. Pratap Misra and Per Enge, “Global Positioning System Signals, Measurement, and Performance,” Ganga- Jamuna Press, 2/e, Massachusetts, 2010.
3. Bradford W.Parkinson and James J. Spilker, “Global Positioning system: Theory and Application,” Vol.II, American Institution of Aeronautices and Astronautics Inc., Washington, 1996.

EC 422

SEMINAR

Instruction	3L Periods per week
Sessionals	25 Marks
Credits	1

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of state of the art topics in a broad area of his /her specialization.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to following aspects of seminar presentations.

- Literature survey
- Consolidation of available information
- Power point Preparation
- Technical writing

Each student is required to:

1. Submit a one page synopsis of the seminar talk for display on the notice board.

2. Give twenty(20) minutes presentation through OHP/ PPT/ Slide Projector followed by Ten(10) minutes discussion

3. Submit a report on the seminar topic with list of references and hard copy of the slides.

Seminars are to be scheduled from 3rd week to the last week of the semester and any change in schedule should be discouraged.

For the award of sessional marks students are judged by three (3) faculty members and are based on oral and written presentations as well as their involvement in the discussions during the oral presentation.

Note: Topic of the seminar should be from any peer reviewed recent journal publications.

EC 901

PROJECT

Instruction	6L Periods per week
University Examination	Viva-voce
University Examination	100 Marks
Sessionals	50 Marks
Credits	9

Dealing with a real time problem should be the focus of under graduate project.

All projects will be monitored at least four times in the II-semester through individual presentations (Project batch wise).

Every student should maintain a project dairy, wherein he/she needs to record the progress of his/her work and get it signed at least once in a week by the guide(s). If working outside and college campus, both the external and internal guides should sign the same.

Sessional marks should be based on the marks, awarded by a project monitoring committee of faculty members as well as the marks given by the guide.

Common norms are established for final documentation of the project report, the students are directed to download from the website regarding the guidelines for preparing the project report and the project report format.

The project report shall be evaluated for 100 Marks by the External Examiner.

If the project work found inadequate in the end examination, the candidate should repeat the project work with a new problem or improve the quality of work and report it again.

Break up for 100 Marks in the end examination:

1. Power point presentation 20 Marks
2. Thesis/Report preparation 40 Marks
3. Viva-voce 40 Marks

EC 471

DESIGN OF FAULT TOLERANT SYSTEMS

(ELECTIVE - III)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. The course provides basic concepts of various faults & failures occur in digital systems
2. Test vector generation to identify the faults.
3. To understand concept of redundancy
4. To understand various self checking circuits.
5. To understand built in self test and its testability into logic circuits.

Course Outcomes: Students will be able to

1. Identify various types of faults and failures
2. Analyze reliability of systems
3. Implement redundancy concept in digital systems
4. Design of failsafe circuits
5. Design of testable digital circuits
6. Design of built in self test for VLSI circuits

UNIT – I: BASIC CONCEPTS

Reliability concepts: Failures and faults, Reliability and failure rate, Relation between Reliability & Mean Time between Failure (MTBF), Maintainability & Availability, reliability of series and parallel systems. Modeling of faults. Introduction to test generation for combinational logic circuits: conventional methods, random testing, transition count testing and signature analysis.

UNIT – II : FAULT TOLERANT DESIGN

Basic concepts: Static, Dynamic and Hybrid redundancy. NMR, Triple modular redundancy (TMR) system, self purging redundancy, Siftout Modular Redundancy (SMR). Use of error correcting codes, time redundancy, software redundancy.

UNIT – III: SELF CHECKING CIRCUITS AND FAIL-SAFE LOGIC

Design of totally self checking checkers, checkers using m-out of n-codes, Berger codes and low cost residue code, self-checking sequential machines, partially self-checking circuits. Fail safe Design: Strongly fault secure circuits, fail-safe design of sequential circuits using partition theory and Berger codes, totally self checking PLA design.

UNIT- IV: DESIGN FOR TESTABILITY FOR COMBINATIONAL CIRCUITS

Basic concepts of testability, controllability and observability, the Reed-Muller expansion technique, three level OR-AND-OR design, use of control logic and syndrome testable design.

UNIT –V: BUILT IN SELF TEST

BIST concepts, Built in Digital Circuit Observer (BIDCO), built-in-test of VLSI chips, Design for autonomous self test, designing testability into logic boards, generic offline BIST architecture.

Text Books:

1. Parag K. Lala, "Fault Tolerant and Fault Testable Hardware Design", BS Publications, 2002.
2. Konad Chakraborthy & Pinaki Mazumdar, "Fault tolerance and Reliability Techniques for high – density random – access memories Reason", Pearson Education, 2002.
3. Miron Abramovici, Melvin A. Breuer, A. D. Friedman – "Digital Systems Testing and testable Design", Jaico publications, Wiley-IEEE Press 1994.

Suggested Reading:

1. N.N. Biswas, "Logic Design Theory", PHI, 1993.
2. Parag K. Lala, "Digital systems Design using PLD's", PHI, 1990.

EC 472

REAL TIME OPERATING SYSTEMS

(ELECTIVE –III)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the need of real time operating system.
2. To learn the basic concepts of interprocess communication (IPC).
3. To analyse various scheduling algorithms related to RTOS.
4. To introduce the elementary concepts of Vx works.
5. To study the basic concepts of UNIX operating system.
6. To undetstand the design and development of a target system.

Course Outcomes:

Student will be able to:

1. Understand Real-time operating system requirements and applications.
2. Categorize different scheduling approaches for real time scheduler.
3. Compare different real time systems.
4. Analyze a module and understand design issues.
5. Develop a real time embedded system module.
6. Build a user end module.

UNIT-I

Introduction to Real Time Systems

Structures of Operating System (Monolithic, Microkernel, Layered, Exo-kernel and Hybrid kernel structures), Operating system objectives and functions, Virtual Computers, Interaction of OS and Hardware architecture, Evolution of operating systems, Batch, multi programming. Multitasking, Multiuser, parallel, distributed and real-time OS.

UNIT-II

Process Management of OS/RTOS

Hard versus Soft Real-Time System: Jobs and Processors, release time, deadlines, and timing constraints, hard and soft timing constraints, hard real-time systems. Uniprocessor Scheduling: Types of scheduling, scheduling algorithms: FCFS, SJF, Priority, Round Robin, UNIX Multi-level feedback queue scheduling, Thread scheduling, Multiprocessor scheduling concept, Real Time scheduling concept.

UNIT-III

Real Time Operating System Concepts

Foreground and Background Systems, Shared Resource, Critical section of a Code, Multi Tasking, Task, Context switch, Kernel, Scheduler, Preemptive and non-preemptive kernel, Inter Task Communication: Message Mailboxes, Message queues or pipes and Event flags, Semaphores, Interrupts.

UNIT-IV

Introduction to Vxworks/UNIX OS

Elementary Concepts of VxWorks: Multitasking, Task State Transition, Task Control- Task Creation and Activation, Task Stack, Task Names and IDs, Task Options, Task Information, Task Deletion and Deletion Safety.

Fundamental Concepts of UNIX Operating Systems

Unix Kernel – File system, Concepts of – Process,

Concurrent Execution & Interrupts. Process Management – forks & execution. Basic level Programming with system calls, Shell programming and filters.

UNIT-V

Linux development process

Types of Host /Target Development and debug setup, Generic Architecture of an Embedded Linux System, System start up, Types of Boot configurations, System Memory Layout, Development Tools: Project Workspace, IDE, GNCC cross platform, selecting and configuring kernel, Setting up bootloader.

Text Books:

1. Tanenbaum,"Modern Operating Systems," 4/e, Pearson Edition, 2014.
2. Jane W.S.Liu, Real Time Systems, Pearson Education, Asia, 2001.

Suggested Reading:

1. Jean J Labrosse,"Embedded Systems Building Blocks Complete and Ready-to-use Modules in C" ,2/e, CRC Press ,1999.
2. Karim Yaghmour, Jon Masters, Gilad Ben-Yesset, Philippe Gerum, "Building Embedded Linux Systems", O'Reilly Media, 2008.
3. Wind River Systems, "VxWorks Programmers Guide 5.5", Wind River Systems Inc.2002.

EC 473

ELEMENTS OF SOFTWARE DEFINED RADIO
(ELECTIVE - III)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To make the students understand the difference between Superhetrodyne Radio and Software defined Radio (SDR).
2. To differentiate between Cognitive Radio (CR) and SDR.
3. To give the Knowledge to students about FPGA based architectures with low power consumption.
4. To make the students know about the various SDR signal processing devices.
5. To understand the single node Cognitive radio techniques and basics of Co-operative Spectrum sensing.
6. To make the students aware about the usage and applications of Cognitive radio hardware.

Course Outcomes:

The student will be able to:

1. Understand the difference between the Super hetrodyne receiver, SDR and CR.
2. Know the different architectures of SDR.
3. Learn the various signal processing devices of SDR.
4. Understand the difference between single node and multi node spectrum sensing technique .
5. Understand the Energy based sensing technique.
6. Know the applications of SDR.

UNIT-I

Introduction to SDR

What is Software-Defined Radio, The Requirement for Software-Defined Radio, Legacy Systems, The Benefits of Multi-standard Terminals, Economies of Scale, Global Roaming, Service Upgrading, Adaptive Modulation and Coding, Operational Requirements, Key Requirements, Reconfiguration Mechanisms, , Handset Model, New Base-Station and Network, Architectures, Separation of Digital and RF, Tower-Top Mounting, BTS Hoteling, Smart Antenna Systems, Smart Antenna System Architectures, Power Consumption Issues, Calibration Issues, Projects and Sources of Information on Software Defined Radio.

UNIT-II

Basic Architecture of a Software Defined Radio

Software Defined Radio Architectures, Ideal Software Defined Radio Architecture, Required Hardware Specifications, Digital Aspects of a Software Defined Radio, Digital Hardware, Alternative Digital Processing Options for BTS Applications, Alternative Digital Processing Options for Handset Applications, Current Technology Limitations, A/D Signal-to-Noise Ratio and Power Consumption, Derivation of Minimum Power Consumption, Power Consumption Examples.

UNIT-III

Signal Processing Devices and Architectures

General Purpose Processors, Digital Signal Processors, Field Programmable Gate Arrays, Specialized Processing Units, Tilera Tile Processor, Application-Specific Integrated Circuits, Hybrid Solutions, Choosing a DSP Solution, Comparison of all processors.

UNIT-IV

Cognitive Radio : Techniques and signal processing

History and background, Communication policy and Spectrum Management, Cognitive radio cycle, Cognitive radio architecture, SDR architecture for cognitive radio, Spectrum sensing Single node sensing: energy detection. Introduction and challenges of Co-operative spectrum sensing.

UNIT-V

Cognitive Radio: Hardware and applications

Spectrum allocation models. Spectrum handoff, Cognitive radio performance analysis. Hardware platforms for Cognitive radio (USRP, WARP), details of USRP board, Applications of Cognitive radio.

Text books:

1. Eugene Grayver, "Implementing Software Defined Radio", Springer, New York Heidelberg Dordrecht London, ISBN 978-1-4419-9332-8 (eBook) 2013.
2. Bruce A. Fette, "Cognitive Radio Technology", Elsevier, ISBN 10: 0-7506-7952-2, 2/e, 2006.

Suggested Reading:

1. Peter B. Kenington, "RF and Baseband Techniques for Software Defined Radio", Artech House Publishers, Inc © 2005.
2. Hüseyin Arslan, "Cognitive Radio, Software Defined Radio and Adaptive Wireless Systems", Springer, ISBN 978-1-4020-5541-6 (HB), 2007.

EC 474

WIRELESS SENSOR NETWORKS
(ELECTIVE - III)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives:

1. To learn basic principles behind a Wireless Sensor Network.
2. To study network protocols, services and applications.
3. To study the importance of issues such as privacy, integrity, authentication, secure localization, secure aggregation, attacks and defense mechanisms.
4. To study simulation of wireless networks.
5. To understand the routing protocols.

Course Outcomes:

After completion of the course the student shall be able to:

1. Understand the basic characteristics of wireless sensor networks.
2. Understand sensor deployment mechanisms of wireless sensor networks.
3. Analyze various network level protocols for MAC and routing in WSN
4. Identify the importance of time synchronization, localization, coverage and deployment.
5. Analyze the issues related to data processing and aggregation, energy efficiency.
6. Understand dependability issues of WSN such as security and authentication

UNIT-I

Overview of Wireless Sensor Networks and Applications

Examples of available sensor networks applications; Enabling Technologies for Wireless Sensor Networks. Design challenges, Contemporary network architectures, Operational and computational models, Performance metrics, Optimization Goals and Figures of Merit, Software and hardware setups

UNIT-II

Network Architectures

Sensor deployment mechanisms; Issues of coverage; Node discovery protocols; Localization schemes; Network clustering Single-Node Architecture; Energy Consumption of Sensor Nodes ; Gateway Concepts; Sensor Network Scenarios;

UNIT-III

Physical and Link layers

Medium access arbitration; Optimization mechanisms; Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses.

UNIT-IV

Data dissemination and routing Query models

In-network data aggregation;, Topology Control , Clustering, Time Synchronization, Localization and Positioning, Radio energy consumption model; Power management; Sensor Tasking and Control. Routing Protocols- Robust route setup; Coping with energy constraints; Energy-Efficient Routing, Geographic Routing

UNIT-V

Dependability Issues like Security and QoS

Security challenges; Threat and attack models; Quality of Service provisioning; Clock synchronization; Supporting fault tolerant operation; Sensor Node Hardware – Berkeley Motes

Text Books:

1. Cauligi S. Raghavendra, University of Southern California; Krishna Sivalingam, University of Maryland Baltimore County, Taieb M. Znati, University of Pittsburg "Wireless Sensor Networks", Springer, ISBN: 1-4020-7883-8, August 2005.

2. Holger Karl, University of Paderborn, Germany, Andreas Willig, University of Potsdam, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, ISBN: 0-470-09510-5, June 2005.

Suggested Reading:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

EC 475

DIGITAL IMAGE PROCESSING

(ELECTIVE - III)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To Understand the formation of images are formed and represent digitally.
2. To study transform-domain representation of images.
3. To know the principles of image compression and enhancement .
4. Students would be able to solve the problems related to image restoration.
5. To learn lossy and lossless Compression techniques.

Course Outcomes:

Student will be able to:

1. Understand how images are formed, sampled, quantized and represented digitally.
2. Learn the properties and applications of transforms like Fourier, DCT, Haar, DWT and WHT.
3. Use the principles of image compression, enhancement and segmentation for practical applications.
4. Implement the image restoration techniques on the given image.
5. Remove the redundancy in an image.
6. Implement algorithms of image processing using MATLAB in real time systems.

UNIT – I

Elements of Digital Image Processing Systems, Digital image representation, elements of visual perception, Image sampling and Quantization, Basic Relationships between pixels.

UNIT – II

Properties and Applications of Fourier transform: FFT, Discrete cosine transform, Hadamard transform, Haar transform, Slant transform, DWT and Hotelling transform.

UNIT – III

Spatial enhancement techniques: Histogram equalization, direct histogram specification, Local enhancement.

Frequency domain techniques : Low pass, High pass and Homomorphic Filtering, Image Zooming Techniques.

UNIT – IV

Image Degradation model, Algebraic approach to restoration, inverse filtering, Least mean square filter, Constrained least square restoration and interactive restoration. Speckle noise and its removal techniques.

UNIT – V

Redundancies for image compression, Huffman Coding, Arithmetic coding, Bit-plane coding, loss less and lossy predictive coding.

Transform coding techniques: Zonal coding and Threshold coding.

Text Books:

1. Gonzalez R.C. and Woods R.E., “Digital Image Processing” 2/e, PHI, 2005.
2. A.K.Jain, " Fundamentals of Digital Image processing", PHI, 1989.

Suggested Reading:

1. Madhuri A, Joshi, “Digital Image Processing: An algorithmic Approach”, PHI, 2006.
2. U Qidwai, C.H.Chen, “Digital Image Processing,” First Indian Reprint 2013, CRC Press, (Taylor & Francis), Yesdee Publications.

EC 476

SPECTRAL ESTIMATION TECHNIQUES
Elective-III

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Prerequisite: Course on Digital Signal Processing and knowledge of Random signals**.**

Course Objectives:

1. To learn Random Processes.
2. To study Linear Prediction methods.
3. To understand Power Spectral Estimation techniques.
4. To analyse various spectrum estimation algorithms.
5. To understand the difference between parametric methods of power spectrum estimation.

Course Outcomes:

Student will be able to:

1. Analyze various Random Processes.
2. Apply Linear Prediction technique for filtering
3. Perform Wiener Filtering for estimation of Spectrum.
4. Estimate power spectrum of random signal in noisy environment.
5. Develop various parametric models for spectral estimation.
6. Understand the Eigen based algorithms for spectrum estimation.

UNIT-I

Random processes

Stationary random processes, statistical average, statistical averages for joint random processes, Discrete-Time Random signals, Time averages for a Discrete Time Random processes, Mean-Ergodic Process, Correlation Ergodic Processes, Power density Spectrum, Rational power spectra, Relationships between the filter parameters and autocorrelation sequence.

UNIT-II

Forward and Backward linear prediction

Forward and Backward linear prediction, Relationship of an AR process to linear prediction, Solution of Normal equations- The Levinson- Durbin algorithm, Wiener filters for Filtering and Prediction, FIR Wiener Filter.

UNIT-III

Non-parametric methods for Power Spectrum Estimation

Estimation of Spectra from finite duration observation of a signal: Computational of the Energy Density Spectrum, Periodogram, Use of DFT in Power Spectrum Estimation.Bartlett's, Welch and Blackman-Tukey methods, Performance Characteristics of Nonparametric Power Spectrum Estimators.

UNIT- IV

Parametric methods for Power Spectrum Estimation

Relationships between auto correlation sequence and model parameters, Methods for AR model parameters: Yule – Walker method, Burg method, Sequential estimation method.MA and ARMA models for Power Spectrum Estimation.

UNIT- V

Eigen Analysis algorithms for Spectrum estimation- Pisarenko's harmonic decomposition method. Music and ESPIRIT algorithms.

Text Books:

1. John G.Proakis, Dimitris G. Manolakis, "Digital Signal Procesing", 4/e, Pearson Education, 2007.

Suggested Reading:

1. John G. Proakis,Charles M. Reder,Fuynn Ling, Marc Moonen, Ian K. Proudler, Chrysostomos L Nikas,"Algorithms for statistical Signal Processing", Pearson Education, Asia Publisers, Indian Edition, 1/e, 2002.
2. Alan V. Oppenheim & Ronald W. Schafer, "Digital Signal Processing," PHI, 2/e, 2010.

EC 477

ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATABILITY (EMI and EMC)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. The course provides basic information on the different EMI (Electromagnetic Interference) problems occurring in intersystem
2. the possibleEMI mitigation techniques in Electronic design.
3. To understand sub-system level design and to measure the emission, immunity level from different systems to couple with the prescribed EMC (Electromagnetic Compatibility) standards.
4. To understand various EMI measurement test facilities.
5. To understand EMI/EMC sources, EMI problems and their solutions at PCB level.

Course Outcomes:

Students will be able to:

1. Identify various sources of electromagnetic interference and compatibility that could affect electronic equipments.
2. Know the different grounding and cabling techniques required to minimize the effects of EMI.
3. Understand the various techniques of shielding and bonding involved in the design of an EMI free system
4. Use different instruments to test and measure EMI/EMC parameters.
5. Acquire knowledge of the effective EMC design practices that are critical to avoid unnecessary costs of additional EMC suppression measures.
6. Know the mandatory governmental requirements to minimize a digital product's Electro-Magnetic noise emissions.

UNIT- I

Introduction: History and concepts of EMI/EMC, Definitions of EMI/EMC, Classification of EMI/EMC. Specifications, National /International standards, limits, Units of specifications, Civilian standards and Military standards.

Natural and manmade sources of EMI/EMC: Sources of Electromagnetic noise, typical noise paths, modes of noise coupling, designing for EM compatibility, lightening discharge, Electro-Static Discharge (ESD), Electro-Magnetic Pulse (EMP), Radiated and Conducted Emissions.

UNIT- II

Grounding and Cabling: Principles and types of Grounding, Safety and signal grounds, low and high frequency grounding methods, grounding of amplifiers and cable shields, isolation, neutralizing Transformers, shield grounding at high frequencies, digital grounding, types of cables, mechanism of EMI emission/coupling in cables.

UNIT- III

Shielding and Bonding: Principles and types of shielding and bonding, effectiveness of shielding, near and far fields / impedances, methods of analysis, total loss due to absorption and reflection effects, composite absorption and reflection losses for electric fields/magnetic fields, magnetic materials as a shield, shield discontinuities, slots and holes, seams and joints, conductive gaskets

Electrical Bonding, Shape and Material for Bond straps, General Characteristics of good bonds.

UNIT- IV

EMI Measurements: EMI test instruments and systems, EMI test, EMI shielded and anechoic chamber, reverberating chamber, Open area test site, TEM cell, GTEM cell, comparison of test facilities.

UNIT- V

Non-ideal behavior of EMC Components: Wires, Printed Circuit Board (PCB) lands, Effect of component leads, capacitors, inductors, resistors and Digital Circuit Devices. Effect of Component Variability

Text Books:

1. Prasad Kodali.V, "Engineering Electromagnetic Compatibility", Wiley India Private Limited, Second edition, 2010
2. Clayton R.Paul, "Introduction to Electromagnetic compatibility", Wiley India Private Limited, Second edition, 2010

Suggested Reading:

1. Keiser, "Principles of Electromagnetic Compatibility", 3rd edition, Artech House, 1987.
2. Electromagnetic Interference and Compatibility IMPACT series, IIT Delhi, Modules 1– 9.
3. Henry W. Ott, "Noise Reduction Techniques in Electronic Systems", Wiley Inter Science, 2nd edition, 2008.

CS 486

OBJECT ORIENTED PROGRAMMING WITH JAVA

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. Write, compile and execute Java programs.
2. Understand the role of the Java Virtual Machine in achieving platform independence.
3. Use threads in order to create more efficient Java programs.
4. Write, compile and execute event driven programming using AWT classes.

Course Outcomes:

1. Design, create, build, and debug Java applications and applets.
2. Create multiple threads for achieving multiple tasks.
3. Write programs using graphical user interface (GUI) components and Java's Event Handling models.
4. Use user defined exception handling to customize any type of errors
5. Create collections to organize objects
6. Use inheritance to reuse objects

Unit-I

Introduction to OOP : Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages ,Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK 1.6.

Programming Constructs : Variables, Primitive Datatypes, Identifiers- Naming Conventions, Keywords, Literals, Operators Binary ,Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops.

Unit-II

Classes and Objects : classes, Objects Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Command line arguments.

Inheritance: Types of Inheritance, Deriving classes using extends keyword, method overloading ,super keyword, final keyword, Abstract class .

Unit-III

Interfaces, Packages and Exceptions : Interface, Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package. Exception -Introduction, Exception handling techniques- try... catch, throws, finally block, user defined exception.

MultiThreading : java.lang.Thread , The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive() and join(), Synchronization, suspending and Resuming threads, Communication between Threads.

Unit-IV:

Input/Output : Reading and writing data, java.io package.

Generics and java.util : Generics,Using Generics in Arguments and Return Types, Defining Your Own Generic Classes, Linked List, Hashset Class, Treeset Class, Hashmap Class,Treemap Class, Collections, Legacy Classes and Interfaces, Difference between Vector and Arraylist , Difference between Enumerations and Iterator.

Unit-V:

Applets: Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint().

Event Handling : Introduction, Event Delegation Moldel, java.awt.event Description, Sources ofEvents, Event Listeners, Adapter classes, Inner classes.

Abstract Window Toolkit: Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons,List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar.

TEXT BOOK:

1. Programming in JAVA,2ed, Sachin Malhotra, Saurabh choudary, Oxford University Press

Suggested Reading:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
2. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
3. Object Oriented Programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya,Selvi, Chu TMH
4. Introduction to Java Programming, 7th ed, Y Daniel Liang, Pearson

ME 464

ENTREPRENEURSHIP

(for Mech, Prod, Civil, EEE & CSE)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

1. To understand the essence of Entrepreneurship
2. To know the environment of industry and related opportunities and challenges
3. To know the concept a procedure of idea generation
4. To understand the elements of business plan and its procedure
5. To understand project management and its techniques
6. To know behavioral issues and Time management

Outcomes: After completing this course, students will be able to:

1. Apply the entrepreneurial process
2. Analyze the feasibility of a new business plan and preparation of Business plan
3. Evaluate entrepreneurial tendency and attitude
4. Brainstorm ideas for new and innovative products or services
5. Use project management techniques like PERT and CPM
6. Analyze behavioural aspects and use time management matrix

UNIT-I

Indian Industrial Environment: Competence, Opportunities and Challenges, Entrepreneurship and Economic growth, Small Scale Industry in India, Objectives, Linkage among small, medium and heavy industries, Types of enterprises, Corporate Social Responsibility.

UNIT-II

Identification and characteristics of entrepreneurs: First generation entrepreneurs, environmental influence and women entrepreneurs, Conception and evaluation of ideas and their sources, Selection of Technology, Collaborative interaction for Technology development.

UNIT-III

Business plan: Introduction, Elements of Business Plan and its salient features, Technical Analysis, Profitability and Financial Analysis, Marketing Analysis, Feasibility studies, Executive Summary.

UNIT-IV

Project Management: During construction phase, project organization, project planning and control using CPM, PERT techniques, Human aspects of project management, Assessment of tax burden

UNIT-V

Behavioral aspects of entrepreneurs: Personality, determinants, attributes and models, Leadership concepts and models, Values and attitudes, Motivation aspects, Change behavior
Time Management: Approaches of time management, their strengths and weaknesses. Time management matrix and the urgency addiction

Text Books:

1. Vasant Desai, "Dynamics of Entrepreneurial Development and Management", Himalaya Publishing House, 1997.
2. Prasanna Chandra, "Project-Planning, Analysis, Selection, Implementation and Review", Tata Mcgraw-Hill Publishing Company Ltd. 1995.
3. S.S. Khanka, "Entrepreneurial Development", S. Chand & Co. Pvt. Ltd., New Delhi

Suggested Reading:

1. Robert D. Hisrich, Michael P. Peters, "Entrepreneurship", Tata Me Graw Hill Publishing Company Ltd., 5lh Ed., 2005
2. Stephen R. Covey and A. Roger Merrill, "First Things First", Simon and Schuster Publication, 1994.
3. Sudha G.S., "Organizational Behavior", National Publishing House, 1996.

CE 422

DISASTER MITIGATION AND MANAGEMENT

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To equip the students with the basic knowledge of hazards, disasters, risks and vulnerabilities including natural, climatic and human induced factors and associated impacts.
2. To impart knowledge in students about the nature, mechanism causes, consequences and mitigation measures of the various natural disasters including hydro metrological and geological based disasters.
3. To enable the students to understand risks, vulnerabilities and human errors associated with human induced disasters including chemical, biological and nuclear warfare agents.
4. To equip the students with the knowledge of various chronological phases in the disaster management cycle.
5. To create awareness about the disaster management framework and legislations in the context of national and global conventions.
6. To enable students to understand the applications of geospatial technologies like remote sensing and geographical information systems in disaster management.

Course Outcomes:

1. Ability to analyse and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at local level
2. Ability to choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan.
3. Ability to understand various mechanisms and consequences of natural and human induced disasters for the participatory role of engineers in disaster management.
4. Develop an awareness of the chronological phases of disaster preparedness, response and relief operations for formulating effective disaster management plans
5. Ability to understand various participatory approaches/strategies and their application in disaster management
6. Ability to understand the concepts of remote sensing and geographical information systems for their effective application in disaster management.

UNIT-I:

Introduction to Natural, human induced and human made disasters – Meaning, nature, types and effects; International decade of natural disaster reduction (IDNDR); International strategy of natural disaster reduction (ISDR)

UNIT-II:

Natural Disasters– Hydro meteorological disasters: Causes, impacts, Early warning systems, structural and non-structural measures for floods, drought and cyclones; Tropical cyclones: Overview, cyclogenesis, drought monitoring and management.; Geographical based disasters: Earthquakes and Tsunami- Overview, causes, impacts, zoning, structural and non-structural mitigation measures; Tsunami generation; Landslides and avalanches: Overview, causes, impacts, zoning and mitigation measures. Case studies related to various hydro meteorological and geographical based disasters.

UNIT III:

Human induced hazards: Risks and control measures in a chemical industry**,** Causes, impacts and mitigation measures for chemical accidents, chemical disaster management, current status and perspectives; Case studies related to various chemical industrial hazards eg: Bhopal gas tragedy; Management of chemical terrorism disasters and biological disasters; Radiological Emergencies and case studies; Case studies related to major power break downs, fire accidents and traffic accidents .

UNIT IV:

Use of remote sensing and GIS in disaster mitigation and management; Scope of application of ICST (Information, communication and space technologies in disaster management, Critical applications& Infrastructure; Potential application of Remote sensing and GIS in disaster management and in various disastrous conditions like earthquakes, drought, Floods, landslides etc.

UNIT V:

Concept of Disaster Management: Introduction to disaster management, Relationship between Risk, vulnerability and a disaster, Disaster management cycle, Principles of disaster mitigation: Hazard identification and vulnerability analysis, Early warning systems and forecasting; Infrastructure and development in disaster management; Disaster management in India: National disaster management framework at central, state, district and local levels. Community based disaster management.

Text Books :

1. Rajib, S and Krishna Murthy, R.R (2012), “Disaster Management Global Challenges and Local Solutions" Universities Press Hyderabad.
2. Notes / Reading material published by National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.

Suggested Reading:

1. Navele, P & Raja, C.K. (2009), Earth and Atmospheric Disasters Management, Natural and Manmade. B.S. Publications, Hyderabad.
2. Fearn-Banks, K (2011), Crises computations approach: A case book approach. Route ledge Publishers, Special Indian Education, New York & London.
3. Battacharya, T. (2012), Disaster Science and Management. Tata McGraw Hill Company, New Delhi.

ME 472

INTELLECTUAL PROPERTY RIGHTS

(for Mech, Prod, Civil, ECE, EEE, CSE, IT)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

1. To introduce fundamental aspects of IP
2. Introducing all aspects of IPR acts.
3. Creating awareness of multi disciplinary audience
4. Creating awareness for innovation and its importance
5. Exposing to the changes in IPR culture
6. Awareness about techno-business aspects of IPR

Outcomes: At the end of the course, a student

1. Will respect intellectual property of others
2. Learn the art of understanding IPR
3. Develop the capability of searching the stage of innovations.
4. Capable of filing a patent document independently.
5. Completely understand the techno-legal business angle of IP. .
6. Capable of converting creativity into IP and effectively protect it.

UNIT-I

Overview of Intellectual Property: Introduction and the need for intellectual property right (IPR), IPR in India – Genesis and Development, IPR abroad, Some important examples of IPR. Importance of WTO, TRIPS agreement, International Conventions and PCT

Patents: Macro economic impact of the patent system, Patent and kind of inventions protected by a patent, Patent document, How to protect your inventions. Granting of patent, Rights of a patent, how extensive is patent protection. Why protect inventions by patents. Searching a patent, Drafting of a patent, Filing of a patent, the different layers of the international patent system, (national, regional and international options), compulsory licensing and licensers of right & revocation, Utility models, Differences between a utility model and a patent. Trade secrets and know-how agreements.

UNIT-II

Industrial Designs: What is an industrial design. How can industrial designs be protected? What kind of protection is provided by industrial designs? How long does the protection last? Why protect industrial designs?

UNIT-III

Trademarks: What is a trademark, Rights of trademark? What kind of signs can be used as trademarks. Types of trademark, function does a trademark perform, How is a trademark protected? How is a trademark registered. How long is a registered trademark protected for? How extensive is trademark protection. What are well-known marks and how are they protected? Domain name and how does it relate to trademarks? Trademark infringement and passing off.

UNIT-IV

Copyright: What is copyright. What is covered by copyright. How long does copyright last? Why protect copyright? Related Rights: what are related rights. Distinction between related rights and copyright. Rights covered by copyright? Copy rights in computer programming.

UNIT-V

Enforcement of Intellectual Property Rights: Infringement of intellectual property rights Enforcement Measures Emerging issues in Intellectual property protection. Case studies of patents and IP Protection.

Unfair Competition: What is unfair competition. Relationship between unfair competition and intellectual property laws.

Text Books:

1. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd , 2006
2. B. L.Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000
3. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi 2010

Suggested Reading:

1. Cronish W.R1 Intellectual Property; Patents, copyright, Trad and Allied rights, Sweet & Maxwell, 1993.
2. P. Narayanan, Intellectual Property Law, Eastern Law Edn., 1997.
3. Robin Jacob and Daniel Alexander, A Guide Book to Intellectual Property Patents, Trademarks, Copy rights and designs, Sweet, Maxwell 4th Edition.

ME 555

HUMAN RIGHTS AND LEGISLATIVE PROCEDURE

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives: To help students

1. To understand the value of human rights
2. To understand the Lawful rights available to him and others
3. To create understanding the rights of under privileged and respect them
4. To understand role of an individual in the Civil Society

Course Outcomes:

1. At the end of the course student will understand the process of evolution of human rights
2. Will understand constitutional protection available
3. Will understand the conditions of under privileged persons and will adopt a positive attitude towards.
4. Will understand the role of Law in protecting environment and will recognize right to life.

Unit-I

Meaning and concept of Human Rights: Notion and classification of Rights, Moral and Legal Rights, Three generations of rights (Civil, and Political Rights, Economic Social and Cultural Rights, Collective/Solidarity Rights). Indian Bill of Rights and Sarodaya. Preamble of Indian Constitution, Fundamental Rights-Directive Principles-Fundamental Duties.

Unit-II

Human Rights enforcement mechanism Human Rights Act, 1993, Judicial organs-Supreme Court (Art 32) and High Court (Art 226), Human Rights Commission, National and State Commission of Women/Children/Minority/SC/ST.

Unit-III

A Right to development, Socio-Economic and Cultural Effects of Globalization, Right to Education, Transparency in Governance and Right to Information, Consumer Protection act.

Unit-IV

Environment Rights such as right to clean environment and public safety: Issues of Industrial Pollution, Prevention, Rehabilitation: Safety aspects of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment.

Unit-V

Role of Advocacy Groups: (a) Professional bodies: Press, media role of Lawyers – Legal Aid., (b) Educational Institutions (c) Role of Corporate Sector (d) N.G.Os .

Text Books:

1. The history of Human rights by M.r. Ishay, Orient Longman, Newdelhi, 2004.
2. S.N. Chaudhary, Human Rights and Poverty in India: Theoretical Issues, Delhi: Concepts, 2005.
3. Anuradha Kumar, Encyclopedia of Human Rights Development of under Privilege, New Delhi: Sarup, 2002.
4. P.M. Katare and B.C. Barik, Development, Deprivation and Human Rights, Violation, New Delhi: Rawat, 2002.

Suggested Reading:

1. Venket Iyer, (ed.), Democracy, Human Rights and the Rule of Law: Essays in Honour of Nani Palkhivala, New Delhi: Butterworth's, 2000.
2. R.J. Cook and C.G. Ngwena (ed.), Health and Human Rights, OUP, Clarendon, 2007.
3. Ethics of Science and Technology: Explorations of the Frontiers of Science and Ethics, OUP, Clarendon, 2006.
4. K.P. Saksena, (ed.), Human Rights and the Constitution: Vision and the Reality, New Delhi: Gyan Pub., 2003

EC 481

NANO TECHNOLOGY

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To gain the knowledge of different nano materials, properties of materials.
2. To study the concepts of nano science and nano technology.
3. To list out the challenges in the nano technology.
4. To studey the structures of various nano particals.
5. To study the process of nano fabrication and fabrication of MEMS.
6. To study various applications of nano materials.

Course Outcomes:

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

1. Describe and explain Nanotechnology.
2. Describe Nano materials based on their dimensionality.
3. Explain the importance of reduction in materials dimensionality, and its relationship with materials properties.
4. Explain top-down and bottom-up approaches for Nano material fabrication, and give some examples.
5. Give examples on the use of Nanotechnology in biomedical and optical applications.
6. Give examples on the use of Nanotechnology in microelectronics applications.

UNIT – I

Nano Materials

Materials, Electrical and optical properties, Superconducting properties, magnetic properties, mechanical properties, Application of Nanomaterials.

UNIT – II

Introduction to Nano Technology

Evolution of Nanoscience and technology, Introduction to Nanotechnology, Moores law, Bottom – up and Top – down approaches, Challenges in Nanotechnology.

UNIT – III

Nano Structures

Zero dimensional Nano Structures: (Nano Particles) – Introduction, Nano particles through homogeneous nucleation, Nano particles through heterogeneous nucleation, One dimensional Nano structures: (Nano Wires, Nano rods) – Introduction, template based synthesis.

UNIT – IV

Nano Fabrication

Introduction to micro, Nano fabrication, Lithography, Electron beam lithography, Thin film deposition. MEMS: Types of MEMS, Fabrication of MEMS.

UNIT – V

Special Nano Materials

Nano Composites: Introduction, Synthesis procedures, various systems (metal – polymer, metal – ceramics) characterization procedures, applications. Nano Biomaterials: Introduction, Biocompatibility, applications.

Text Books:

1. A S Edelstein & R C Cammarata, "Nano Materials", Institute of physics publishing, UK 1997.
2. Guozhong cao, "Nano Structures and Nano materials", Imperial college press, 2/e, 2004.
3. A.K. Bandyopadyay, "Nano Materials", New Age Publications, 2009.

Suggested Reading:

1. Carl C.Koch, "Nano Structured Materials Synthesis, Properties and Applications", Jaico Publishing House, 2007.
2. Ghodssi, Reza, Lin, Pinyen, "MEMS materials and Processes Handbook", 1/e, Springer Publishers, 2010.

IT 428

NETWORK SECURITY (for ECE)

Instruction	4L Periods per week
Duration of End Examination	3 Hours
End Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Prerequisites: Data Communications,Computer Networks

Course Objectives:

1. To introduce the basics of network security
2. To familiarize with key distribution and security in the transport layer
3. To present wireless network protocols and email security
4. To discuss about Internet protocol security and Intruder detection
5. To impart knowledge about malicious software and firewalls

Course Outcomes:

After successful completion of the course, students will be able to

1. Understand the basics of network security and apply related concepts for ensuring security
2. Understand the principles of encryption, cryptography and message authentication
3. Understand the key distribution and security considerations in the transport layer
4. Apply wireless network security protocols and email security
5. Understand IP security and Intrusion detection
6. Detect malicious software and configure a firewall

UNIT -I

Introduction: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Standards, **Symmetric Encryption and Message Confidentiality:** Symmetric Encryption Principles, **Public-Key Cryptography and Message Authentication:** Approaches to Message Authentication, Secure Hash Functions, Message Authentication Codes, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures

UNIT - II

Key Distribution and User Authentication: Symmetric Key Distribution using Symmetric Encryption, Kerberos, Key Distribution Using Asymmetric Encryption, X.509 Certificates, Public-Key Infrastructure,**Transport-Level Security:** Web Security Considerations, Secure Socket Layer and Transport Layer Security, Transport Layer Security, HTTPS, Secure Shell (SSH)

UNIT - III

Wireless Network Security: IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security, Wireless Application Protocol Overview, Wireless Transport Layer Security, WAP End-to-End Security, **Electronic Mail Security:** Pretty Good Privacy, S/MIME, Domain Keys Identified Mail

UNIT - IV

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange, **Intruders:** Intruders, Intrusion Detection, Password Management

UNIT - V

Malicious Software: Types of Malicious Software, Viruses, Virus Countermeasures, Worms, Distributed Denial of Service Attacks, **Firewalls:**The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Firewall Location and Configurations

Text Books:

1. William Stallings, Network Security Essentials: Applications and Standards, Fourth Edition, Pearson, 2011.
2. William Stallings, Cryptography and Network Security: Principles and Practice, Sixth edition, Pearson, 2013.

Suggested Reading:

1. Eric Maiwald, “Fundamentals of Network Security”, Tata McGraw Hill, 2011.
2. PallapaVenkataram, “Wireless and Mobile Network Security”, Tata McGraw Hill, 2010.

Web Resources:

1. http://www.cisco.com/cisco/web/solutions/small_business/resource_center/articles/secure_my_business/what_is_network_security/index.html?referring_site=smartnavRD
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-857-network-and-computer-security-spring-2014/lecture-notes-and-readings/

CS 411

ARTIFICIAL INTELLIGENCE

Instruction	4L Periods per week
Duration of End Examination	3 Hours
End Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To list the significance of AI.
2. To discuss the various components that are involved in solving an AI problem.
3. To analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.
4. Apply the AI concepts to build an expert system to solve the real world problems.

Course Outcomes:

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

1. Differentiate between a rudimentary Problem and an AI problem, it's Characteristics and problem solving Techniques.
2. Determine and evaluate the various search strategies.
3. Compare and contrast the various "knowledge representation" schemes of AI.
4. Understand and Analyze the various reasoning techniques involved in solving AI problems.
5. Understand the different learning techniques.
6. Apply the AI techniques to solve the real world problems.

UNIT I

Introduction & Problem Solving: AI problems, AI Technique, Defining problem as a State-Space Search, Production Systems, Problem Characteristics, Production System Characteristics.

Heuristic Search Techniques: Generate – and – test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis.

UNIT II

Game Playing: Overview, Min-Max search Procedure, Adding Alpha-beta Cutoffs, Additional Refinements, Iterative Deepening.

Knowledge Representation Issues: Approaches, Issues, Frame Problem,

Using Predicate Logic: Representing simple facts in logic, Representing Instance and ISA Relationships, Computable Functions and predicates, Resolution, Natural Deduction.

UNIT III

Uncertainty and Reasoning Techniques: Non monotonic reasoning, Logics for Non monotonic reasoning, Implementation issues, Augmenting a problem solver, implementation of Depth First Search and Breadth first search.

Statistical reasoning: Probability and Bayes theorem, Certainty factors and Rule-based systems, Bayesian Networks, Dempster-Shafer Theory.

UNIT IV

Learning: What is Learning, Rote learning, Learning by taking advice, Learning in problem solving, learning from examples: Induction, Learning by Decision trees.

Expert System: Representing and Using Domain Knowledge, Expert systems shells, Explanation, Knowledge Acquisition.

UNIT V

Perception and Action: Real Time Search, Vision, Speech Recognition, ACTION: Navigation, Manipulation, Robot architectures.

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Statistical NLP, Spell Checking.

TEXT BOOKS:

1. Elaine Rich, Kevin Night, Shivashankar B Nair, "Artificial Intelligence",3rd Edition.,2008

2. Russell Norvig, "Artificial Intelligence-Modern Approach", 3rd edition, 2009.

Suggested Reading:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2012.
2. Nelson M. Mattos , "An Approach to Knowledge Base Management", Springer Berlin Heidelberg, 1991.

IT 429

INTERNET OF THINGS (for ECE)

Instruction	4 L periods per week
Duration of End Examination	3 Hours
End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Programming and Problem Solving, Basic Electronics, Computer Organization

Course Objectives:

1. To provide an overview of Internet of Things, building blocks of IoT and the real-world applications
2. To introduce Rasberry Pi device, its interfaces and Django Framework.

Course Outcomes:

After successful completion of the course, student will be able to

1. Understand the terminology, enabling technologies and applications of IoT
2. Learn the concept of M2M (machine to machine) and describe the differences between M2M and IoT.
3. Understand the basics of Python Scripting Language which is used in many IoT devices
4. Describe the steps involved in IoT system design methodology
5. Design simple IoT systemsusing the understanding of the Rasberry Pi board and interfacing sensors and actuators with Rasberry Pi
6. Develop web applications using python based web application framework called Django.

Unit I

Introduction & Concepts: Introduction to Internet of Things- Definitions & Characteristics of IoT, Physical Design of IOT-Things in IoT, IoT Protocols, Logical Design of IOT-IoT Functional Blocks, IoT Communication Models, IoT Communication APIs, IOT Enabling Technologies-Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IOT Levels & Deployment Templates.

Unit II

Domain Specific IoTs – IoT applications for Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

IoT and M2M – Introduction, M2M, Differences between IoT and M2M, Software Defined Networking, Network Function Virtualization.

Unit III

Introduction to Python–Motivation for using Python for designing IoT systems, Language features of Python, Data types- Numbers, Strings, Lists, Tuples, Dictionaries, Type Conversions, Data Structures: Control of flow-if, for, while, range, break/continue, pass, functions, modules, packaging, file handling, data/time operations, classes, Exception handling, Python packages of Interest for IoT - JSON, XML, HTTPLib, URLLib, SMTPLib

Unit IV

IoT Platforms Design Methodology: Introduction, IoT Design Methodology Steps-Purpose and Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device and Component Integration, Application Development, Case Study on IoT System for Weather Monitoring.

Unit V

IoT Physical Devices and End Points: Basic building blocks of an IoT device, Rasberry Pi-About theRasberry Pi board, Rasberry Pi interfaces-Serial, SPI,I2C, Other IoT Devices-pcDuino, BeagleBone Black, Cubieboard

IoT Physical Servers and Cloud Offerings- Introduction to cloud storage models and Communication APIs, WAMP-AutoBahn for IoT, Xivelycloud for IoT

Python Web Application Framework: Django Framework-Roles of Model, Template and View

Text Books:

1. ArshdeepBahga and Vijay Madisetti, “Internet of Things - A Hands-on Approach, Universities Press, 2015.

Suggested Reading:

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014.