PRASAD V. POTLURI
SIDDHARTHA INSTITUTE OF TECHNOLOGY
(AUTONOMOUS)
Kanuru,Vijayawada-520007
AICTE approved, NBA & NAAC accredited, An ISO 9001-2008 certified Institution
Permanent Affiliation to JNTUK, Kakinada.
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ELECTRONICS & COMMUNICATION ENGINEERING

SYLLABUS BOOK

(PVP 14)

B.TECH DEGREE PROGRAMME

Sponsored by
Siddhartha Academy of General & Technical Education
VIJAYAWADA

VISION OF THE INSTITUTION

To provide rich ambience for academic and professional excellence, research, employability skills, entrepreneurship and social responsibility.

MISSION OF THE INSTITUTION

To empower the students with technical knowledge, awareness of up-to-date technical trends, inclination for research in the areas of human needs, capacity building for employment / entrepreneurship, application of technology for societal needs.

Our Other Institutions :

1. Parvathaneni Brahmayya Siddhartha College of Arts & Science
2. Parvathaneni Brahmayya Siddhartha Junior College of Arts & Science
3. Veeramachaneni Paddayya Siddhartha Public School
4. Velagapudi Ramakrishna Siddhartha Engineering College
5. Sri Durga Malleswara Siddhartha Mahila Kalasala
6. Sri Durga Malleswara Siddhartha Junior Mahila Kalasala
7. Y.V. Rao Siddhartha College of Education
8. Sri Velagapudi Durgamba Siddhartha Law College
9. K.C.P. Siddhartha Adarsh Residential Public School
10. K. V. Sadasiva Rao Siddhartha College of Pharmaceutical Sciences
11. A.G. & S.G. Siddhartha Arts & Science College
12. A.G. & S.G. Siddhartha Arts & Science Junior College
13. Siddhartha Institute of Hotel Management & Catering Technology
14. Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation
15. Siddhartha School of Nursing
16. Drs. Sudha & Nageswara Rao Siddhartha Institute of Dental Sciences
17. Dr. C. Sobhanadri Siddhartha College of Nursing

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Department Vision

To evolve as a center of excellence by adopting innovative methods for teaching, learning and research in the diversified fields of Electronics and Communications.

Department Mission

To empower the students with technical knowledge in Electronics and communications for pursuing higher education, for becoming entrepreneurs / employees of prominent companies and also motivating them towards research to meet the societal needs.

Program Educational Objectives(PEO s)

I:	Capable of applying the knowledge of basic sciences and engineering to understand the new concepts of Electronics and Communication Engineering
II:	Able to demonstrate technical competence for the design and development of innovative electronic and communication systems.
III:	Able to work in a team for the fulfillment of leadership role in a company/organization
IV:	Able to demonstrate passion for life-long learning through interdisciplinary research works or projects so to cater societal needs.

Program Outcomes (POs)

Graduates will be able to

a:	Demonstrate knowledge of Mathematics, Random Process, Numerical Methods, Physics and Chemistry
b:	Design analog and digital electronic circuits and conduct experiments, analyze and interpret data
c:	Develop communication systems those meet the required specifications
d:	Visualize and work on laboratory and multidisciplinary tasks
e:	Identify, formulate and solve communication engineering problems
f:	Understand professional and ethical responsibilities
g:	Communicate effectively in both verbal and written form
h:	Have confidence for self-education and ability for life-long learning
i:	Understand the impact of engineering solutions on society and also will be aware of contemporary issues
j:	Demonstrate skills to use modern engineering tools, software and equipment to analyze problems in communication engineering.
k:	Participate and succeed in competitive examinations like GRE, GATE etc..

Department of Electronics and Communication Engineering

Course Structure (effective from Academic Year 2014-15)

I/IV B. Tech. - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC 1T1	Engineering Mathematics – I	3+1*	-	30	70	100	3
EC 1T2	English for Communication	3	-	30	70	100	3
EC 1T3	Engineering Physics	3+1*	-	30	70	100	3
EC 1T4	Engineering Chemistry	3+1*	-	30	70	100	3
EC 1T5	C Programming	3+1*	-	30	70	100	3
EC 1T6	Introduction to Electrical Circuits	3+1*	-	30	70	100	3
EC 1L1	English Language Communication Skills Lab	-	3	25	50	75	2
EC 1L2	Engineering Physics and Chemistry Lab	-	3	25	50	75	2
EC 1L3	C Programming Lab	-	3	25	50	75	2
Total		**23**	**9**	**255**	**570**	**825**	**24**

I/IV B. Tech. - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC 2T1	Engineering Mathematics - II	3+1*	-	30	70	100	3
EC 2T2	Professional Ethics	3	-	30	70	100	3
EC 2T3	Elements of Mechanical Engineering	3+1*	-	30	70	100	3
EC 2T4	Environmental Studies	3	-	30	70	100	3
EC 2T5	Electronic Devices and Circuits	3+1*		30	70	100	3
EC 2T6	Engineering Drawing	2	4	30	70	100	3
EC 2L1	IT Workshop	-	3	25	50	75	2
EC 2L2	Electronic Devices and Circuits Lab	-	3	25	50	75	2
EC 2L3	Engineering Workshop	-	3	25	50	75	2
Total		**20**	**13**	**255**	**570**	**825**	**24**

*Tutorial/Interactive Session

II/IV B. Tech. - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC 3T1	Engineering Mathematics-III	3+1*	-	30	70	100	3
EC 3T2	Probability Theory and Stochastic Process	3+1*	-	30	70	100	3
EC 3T3	Signals and Systems	3+1*	-	30	70	100	3
EC 3T4	Network Analysis and Synthesis	3+1*	-	30	70	100	3
EC 3T5	Electrical Technology	3+1*	-	30	70	100	3
EC 3T6	Switching Theory and Logic Design	3+1*	-	30	70	100	3
EC 3L1	Basic Simulation Lab	-	3	25	50	75	2
EC 3L2	Networks and Electrical Technology Lab	-	3	25	50	75	2
Total		**24**	**6**	**230**	**520**	**750**	**22**

II/IV B. Tech. - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC 4T1	Control Systems	3+1*	-	30	70	100	3
EC 4T2	Pulse and Digital Circuits	3+1*	-	30	70	100	3
EC 4T3	Analog Electronic Circuits	3+1*	-	30	70	100	3
EC 4T4	Electomagnetic Fields and Waves	3+1*	-	30	70	100	3
EC 4T5	Analog Communications	3+1*	-	30	70	100	3
EC 4L1	Analog Communications Lab	-	3	25	50	75	2
EC 4L2	Analog Electronic Circuits Lab	-	3	25	50	75	2
EC 4L3	Pulse and Digital Circuits Lab	-	3	25	50	75	2
Total		**20**	**9**	**225**	**500**	**725**	**21**

*Tutorial/Interactive Session

III/IV B. Tech. - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC5T1	Linear Integrated Circuits	3+1*	-	30	70	100	3
EC 5T2	Transmission Lines and Wave Guides	3+1*	-	30	70	100	3
EC 5T3	Computer-Architecture and Organization	3+1*	-	30	70	100	3
EC 5T4	Antenna and Wave Propagation	3+1*	-	30	70	100	3
EC 5T5	Digital IC Applications	3+1*	-	30	70	100	3
EC5T6	Digital Signal Processing	3+1*	-	30	70	100	3
EC 5L1	Linear IC Applications Lab	-	3	25	50	75	2
EC 5L2	Digital IC Applications Lab	-	3	25	50	75	2
EC5L3	Seminar	-	2	50	-	-	1
Total		**24**	**8**	**280**	**520**	**800**	**23**

III/IV B. Tech. - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC 6T1	VLSI Design	3+1*	-	30	70	100	3
EC 6T2	Microprocessors and Microcontrollers	3+1*	-	30	70	100	3
EC 6T3	Microwave Engineering	3+1*	-	30	70	100	3
EC 6T4	Digital Communications	3+1*	-	30	70	100	3
EC 6T5	Computer Networks	3+1*	-	30	70	100	3
EC 6T6	Free Elective	3+1*	-	30	70	100	3
EC 6L1	Digital Communications Lab	-	3	25	50	75	2
EC 6L2	Microprocessors and Microcontrollers Lab	-	3	25	50	75	2
EC 6L3	OOPS Lab	-	3	25	50	75	2
EC 6L4	Personality Development & Soft Skills Course	-	2	-	-	-	-
Total		**24**	**11**	**255**	**570**	**825**	**24**

Free Elective

EC 6T6FE1 -Introduction to MATLAB(open to all) EC 6T6FE3 -Digital Image Processing (except ECE)
EC 6T6FE2 -Artificial Neural Networks(except ECE)EC 6T6FE4 -Microcontrollers(except ECE)

*Tutorial/Interactive Session

IV/IV B. Tech. - First Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC 7T1	Optical Communications	3+1*	-	30	70	100	3
EC 7T2	Digital Image Processing	3+1*	-	30	70	100	3
EC 7T3	Cellular and Mobile Communications	3+1*	-	30	70	100	3
EC 7T4	Elective-I	3+1*	-	30	70	100	3
EC 7T5	Elective-II	3+1*	-	30	70	100	3
EC 7T6	Managerial Economics and Financial Analysis	3+1*	-	30	70	100	3
EC 7L1	Microwave Engineering and Optical Communications Lab	-	3	25	50	75	2
EC 7L2	Digital Signal Processing Lab	-	3	25	50	75	2
EC 7L3	Mini Project	-	3	75		75	2
Total		**24**	**9**	**305**	**520**	**825**	**24**

Elective-I

EC 7T4A - Embedded and Real Time Systems
EC 7T4B - Digital System Design
EC 7T4C - Artificial Neural Networks and Fuzzy Logic
EC 7T4D - Bio – Medical Instrumentation

Elective-II

EC 7T5A - Wireless Communications and Networks
EC 7T5B - Micro Strip Antennas
EC 7T5C - Radar Systems
EC 7T5D – Speech Processing

IV/IV B. Tech. - Second Semester

Subject Code	Subject	Periods/Week		Marks			Credits
		Theory	Lab/ Practice	Internal	External	Total	
EC 8T1	TV and Satellite Communications	3+1*	-	30	70	100	3
EC 8T2	Elective –III	3+1*	-	30	70	100	3
EC 8T3	Elective -IV	3+1*	-	30	70	100	3
EC 8PW	Project Work	-	9	100	200	300	9
Total		**12**	**9**	**190**	**410**	**600**	**18**

Elective-III

EC 8T2A-DSP Processors and Architectures
EC 8T2B- Introduction to Avionics
EC 8T2C-Electronic Measurements& Instrumentation
EC 8T2D -Global Positioning System (GPS)

Elective- IV

EC8T3A - Project Management
EC8T3B - Industrial Management & Entrepreneurship
EC8T3C - Management Science
EC8T3D - Engineering Economics and Management

*Tutorial/Interactive Session

Electronics & Communication Engineering
ENGINEERING MATHEMATICS-I

EC1T1 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- The main purpose of this course is to provide students with skills in solving differential equitation's, evaluating improper integral using beta and gamma functions.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential integral and vector calculus.

Course Outcomes:

- Acquire the knowledge of solving ordinary differential equations
- Get the knowledge of solving improper integrals using beta, gamma functions.
- Use the method of least squares to find the curve of best fit for the given data.
- Ability to apply double integrals to find area of the given region, triple integrals to find volume of the three dimensional objects.
- Knowledge of finding gradient of scalar point functions, curl, divergence of vector point functions.

UNIT-I

Ordinary Differential Equations:

Exact equations, orthogonal trajectories, applications to Newtons Law of cooling, Law of Natural growth and decay.Non-Homogeneous linear Differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sinax, cosax, polynomials in X, e^{ax} V(x), x V(X).

UNIT-II

Differential Calculus:

Rolle's theorem, Lagrange's mean value theorem and Taylor's theorem (without proofs),Taylor's and Macluarin's series for functions of one variable. Maxima and Minima of functions of two variables, Lagrange's method of multipliers.

UNIT III

Multiple Integrals: Multiple integrals -double and triple integrals-change of variables-Change of order of Integration.

UNIT IV

Vector Differentiation &Integration: Gradient-Divergence-Curl and their related properties of sums-products- Laplacian and second order operators (proofs of identities not included)

Vector Integration -Line integral–work done–Potential function–area-surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems

UNIT V

Curve Fitting &Beta Gamma Functions: Fitting a straight line-Second degree curve-Exponential curve- power curve by method of least squares.

Gamma and Beta functions- properties- Evaluation of improper integrals (applications not included).

Learning Resources

Text Books:

1. Higher Engineering mathematics by B.S. Grewal, khanna publishers

References:

1. Higher Engineering Mathematics,H.K.Das,S.Chand Publications.
2. Engineering Mathematics, B. V. Ramana , Tata Mc Graw Hill

E-learning resources

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering
English for Communication

EC1T2 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial:-- Semester end examination: 70 marks

Course Objectives

- To expose the students to various socio-cultural contexts
- To impart human values.
- To strengthen the writing skills.
- To enhance their communicative competence.
- To improve their vocabulary
- To make them well versed in grammar.
- To enhance their comprehensive ability.

Course outcomes

- Improved comprehensive ability
- Writing skills
- Acquiring human values.
- Knowledge of grammar.
- Cultural adaptability.

List of Experiments

UNIT –I

1. Unity of minds-Abdul kalam.
2. Communication
   a. Process of communication
   b. Types of communication-----Verbal and nonverbal communication.
   c. Listening skills.
3. Synonyms, antonyms from the prescribed syllabus.

UNIT-II

1. 'Next Sunday'--------R.K.Narayan
2. Tenses
3. Active/passive voice

UNIT III

1. 1.'The cop and the anthem'------O.Henry
2. Direct/Indirect speech
3. Letter writing.

UNIT IV

1. 1.'Three Questions'----Leo Tolstoy
2. Degrees of comparison
3. Reading comprehension.

UNIT V

1. Kalpana chawla-----Biographical sketch
2. Correction of sentences.

Learning Resources

Reference books

1. Communication skills ------Sanjay kumar&pushpa latha oxford.
2. Communication skills------Leena sen.(PHI)
3. English for engineering students-----G.V.L.N.Sharma.
4. An approach to communication skills----Bhanu ranjan, Dhanpat rai&co.
5. The craft of Business letter writing-----Mathew, Tata Mac Graw Hill.

E-learning resources

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering
Engineering Physics

EC1T3 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives

To make student understand

- The concepts of Quantum Physics.
- The theoretical picture about a crystal structure.
- How to determine the different crystal structures by using X-diffraction techniques.
- The properties of different types of solids and to have the knowledge about the energy-band diagram in the materials.
- The advanced topics such as lasers, fibre optics and nano- materials.

Course Outcomes

After completion of the course student will be

- Acquiring the knowledge of Quantum physics the student will have the basics about the atomic scale of the systems.
- Learning crystal structure and the X-ray diffraction Techniques the student could differentiate the different types of crystals.
- Getting the knowledge about the different types of solids the student will know to use the appropriate solids as per requirement.
- Having the knowledge about advanced topics the student will be ready to the upcoming developments in the Engineering Physics.

UNIT-I

Quantum Physics: Planck's black body theory of radiation - Debroglie hypothesis – Properties of matter waves –G.P. Thomson experiment– Davison and Germer experiment – Heisenberg uncertainity principle –Time independent & Time dependent Schrödinger wave equation – physical significance of wave function – Particle in one dimensional potential box.

UNIT-II

Crystal Structure & X-ray Diffraction: Introduction – Space lattice – Basis - unit cell - Lattice parameters – Bravais lattices – Crystal systems – Structure and packing fraction of simple, bcc, fcc crystals. Directions and planes in crystals – miller indices –Distance between successive parallel planes- Diffraction of X rays – Bragg's law –Laue method- Powder method.

UNIT-III

Physics of Solids-I Classical free electron theory-Quantum free electron theory- Fermi Dirac distribution function-Bloch theorem- Kronig penny model(qualitative treatment)- Classification of materials .

Dielectric constant – electronic, ionic and orientation polarizations–internal fields in solids – Clausius Mossotti relation –causes of dielectric breakdown.

UNIT-IV

Physics of Solids-II: Introduction – intrinsic semiconductor and carrier concentration- Fermi level in intrinsic semiconductor conductivity in intrinsic semiconductor– extrinsic semiconductor –carrier concentration- Fermi level in extrinsic semiconductor – Drift and diffusion current – Einstein's relations – Direct and Indirect band gap semiconductors.

Origin of magnetic moment – classification of magnetic materials – Hysteresis curve – soft and hard magnetic materials- applications.

UNIT-V

Advanced Physics: Lasers Characteristics of lasers – spontaneous and stimulated emission of radiation – population inversion – pumping – Ruby, Helium-Neon & Semiconductor lasers-Applications of lasers.

Fiber optics Principle of optical fiber – Acceptance angle and numerical aperture – Attenuation in optical fibers – applications of optical fibers.

Introduction – Surface to volume ratio- Quantum confinement effect- properties and preparation of nanomaterial – nanotubes – SWNT- MWNT- Applications of nanomaterials.

Learning Resources

Text Books

1.Solid state Physics by S.O.Pillai. (New Age International Publications)
2.Engineering physics by M.R.Srinivasan (New Age International Publications).

References

1. Engineering physics by D.K.Bhattacharya and A.Bhaskaran. (Oxford Publications).
2. Engineering physics by R.K Gaur and S.L. Gupta, Dhanpat Rai Publications

E-learning resources

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering
Engineering Chemistry

EC1T4 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives

- To acquire knowledge about desalination of brackish water and treatment of municipal water.
- To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
- To learn significance of green chemistry and green synthesis and the synthesis of nano materials.
- To understand mechanism of corrosion and preventive methods.
- To understand concept of semi conductivity, superconductivity and liquid crystal and solar energy.

Course Outcomes

After studying this course, students will be able to

- Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
- Replace metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
- Produce economical green synthesis and new methods of synthesis of nano materials.
- Find appropriate metals or combination of metals and develop economical methods for minimizing corrosion.
- Bring the new ideas in converting solar energy into most needy electrical energy efficiently and economically to reduce the environmental pollution.

UNIT – I

A) Water Technology: Introduction, Hardness of water, types of hardness (permanent and temporary)-Degree of hardness-Numericals-determination of hardness by EDTA Method-softening methods (line-soda, ion exchange and zeolite process)

B) Water Treatment: Desalination-reverse osmosis-electrodialysis. Municipal water treatment-removal of microorganisms- by irradiation of UV radiation- bleaching powder process-chlorination-break point of chlorination-By using chloramine-By using ozone.

UNIT - II

A) Polymers: Introduction - Types of polymers (addition and condensation)- mechanism of addition polymerization (free radical, ionic) – Classification - Methods of polymerisation – Stereospecific polymers - Ziegler Natta catalysis - Properties of polymers –Conducting Polymers-Engineering applications – Biodegradable polymers – Individual

polymers(Preparation,Properties, Uses of Poly Styrene, PVC, PTFE, Bakelite's, Cellulose derivatives, PolyCarbonates).

B) Plastics: Types –Compounding of plastics- Moulding(Injection, compression, blow film extrusion and extrusion moulding)- Fiber reinforced plastics (Glass and carbon) –Bullet Proof Plastics– Properties of plastics – Engineering applications.

UNIT - III

A) **Green Chemistry:** Introduction – Principle of green chemistry, methods of green synthesis (aqueous phase,super critical fluid extraction method, phase transfer catalyst, micro wave induced method,ultra sound method.

B) **Nano Materials:** Introduction to Nanomaterials-preparation of few Nano materials(Carbon Nano Tubes,Fullerenes etc)-Properities of Nano materials- Engineering applications.

UNIT – IV

A) **Corrosion:** Defination, causes and consequences of corrosion-mechanism of dry and wet corrosion-galvanicseries,Factors influencing rate of corrosion passivity of metal, types of corrosion (galvonic,differential Aeration,pitting,crevice and stress corrosion).

B) **Corrosion Control:** Cathodic protection (sacrificial anodic protection and impressed current cathodic protection) and Application of protective coating-metallic coatings (galvanization and tinning) organic coatings (paints (mechanism not required), varnishes, lacquers and enamels).

UNIT - V

A) Semiconductors & Superconductivty: Semiconductors-Definition –Types of semiconductors (Stiochiometric,Non Stiochiometric ,Organic, Controlled Valency Semiconductors,Doping)-applications **Superconductivty**– Definition-Preparation –Properties –Engineering Applications.

B) Liquid Crystals & Solar Energy: Liquid Crystals-Definition –Types - applications in LCD and Engineering Applications.

Solar Energy:Introduction – harnessing solar energy – solar heaters – photo voltaic cells – solar reflection –green house concepts.

Learning Resources

Text Books

1. A text book of Engineering Chemistry – N.KrishnaMurthy N.Y.S.Murthy, Dr.V.Anuradha.
2. A text book of engineering Chemistry –II, D.Srinivasulu, Srivastava, Roliverma.
3. A text book of engineering Chemistry, JAIN & JAIN.
4. A text book of engineering Chemistry, C.P.Murthy, C.V.Agarwal. Andra Naidu.

References

1. A text book of Engineering chemistry, S.S.DARA.
2. A text book of Engineering chemistry, Dr.C.Daniel Yesudian

E-learning resources

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering

C Programming

EC1T5 **Credits: 3**

Lecture Hours: 3 periods/Week Internal Assessment: 30 marks

Tutorial: 1 Period/Week Semester end examination: 70marks

Course Objectives

- Learn the structure, syntax and semantics of C programming.
- Learn different control structures like decision control, loop control and arrays.
- Learn the modular programming concepts and storage classes.
- Learn the limitations of basic data types and learn the concepts of derived data types and user defined data types.
- Learn how to perform various FILEI/O.

Course Outcomes

After completion of this course the student would be able to

- Understand the fundamentals of C programming.
- Choose the decision making statements, loops and arrays to solve the problem.
- Use functions to solve the given problem.
- Allocate dynamic memory using pointers.
- Apply the structures, unions and files Operations in a specific need.

UNIT –I

Topic Level Objective: Notion of Computer Languages, algorithm, computational procedure, editing and executing programs and C Declarations.

Basics and Introduction to C: Basics of Computer, Introduction to C, About ANSI C Standard, Machine, Assembly and High-level Language, Assembler, Compiler and Interpreter, Structure of a C program, Programming Rules, Executing the C Program, Standard Directories, Advantages of C, Header Files, Flow Chart, Algorithm, Analyzing Algorithm, Classification Algorithms.

The C Declarations: The C-Character set, Delimiters, Types of Tokens, The C keywords, Identifiers, Constants, Variables, C Data types, dynamic initialization, type modifiers, type conversions, constant and volatile variables. Properties of Operators, Operator Priority ,comma and conditional operators, arithmetic, relational, assignment operators and expressions, logical , bitwise operators. Input and output in c: Formatted and Unformatted functions.

UNIT-II

Topic Level Objective: Understanding branching, iteration, data representation using arrays and strings.

Decision Statements: The if statement, if-else, nested if else, if-else-if ladder, break, continue, goto, Switch statement, nested switch case, Switch case and nested ifs.

Loop Control: for loop, nested for loop, while, do-while, do-while statement with while loop.

Arrays: Array initialization, array terminology, characteristics of an array, 1-D array and its operations, predefined streams, 2-D arrays and operations, Multi -dimensional arrays.

Strings: Declaration and initialization of string, string standard functions, string conversion functions, memory functions, application of strings.

UNIT-III

Topic Level Objective: Modular programming and recursive solution formulation and storage classes.

Functions: Basics, function definition, return statement, types of functions, call by value ,call by reference, function as an argument, Functions with operators, Function and Decision Statements, Functions and loop Statements, Functions with arrays and Pointers, Recursion-Types of Recursion, Rules for Recursive Function, Recursion versus Iterations, Advantages and Disadvantages of Recursion, Efficiency of Recursion, Library Functions.

Storage Class: Variable Lifetime, Automatic Variables, External Variables, Static Variables, Register Variables.

UNIT-IV:

Topic Level Objective: Understanding pointers, dynamic memory allocation and Preprocessor Directives.

Pointers: Features of pointers, pointers and address, pointer declaration, void pointers, arithmetic operations with pointers, pointers and arrays, array of pointers, pointers to pointers,pointers and strings. Dynamic memory allocation, memory models, memory allocation functions.

Preprocessor Directives: The #define Directive, Undefining a Macro, Token Pasting and Stringizing Operators, The #include Directive, Conditional Compilation, The Predefined Macros in ANSI and Turbo-C,Standard I/O Predefined Streams in stdio.h, The Predefined Macros in ctype.h.

UNIT V:

Topic Level Objective: Understanding derived data types of C and basic of file operations.

Structure and Union: Features of Structures, Declaration and initialization of Structures, Structure within Structure, Arrays of Structure, Pointer to Structure, Structure and functions, typedef, Bit fields, Enumerated Data Type, Union, Union of Structures.

Files: Streams and File Types, Steps for File Operations, FILE I/O, Structures Read and Write, Other file function, Command line Arguments, Application of command line arguments, Environment variables.

Learning Resources

Text books

1. Programming in C, by Ashok N.Kamthane, (2nd edition), Pearson publications,2011.

References

1. Programming in ANSI C (5th Edition) by E.Balaguruswamy, McGraw-Hill publications.
2. "A first book of ANSI C", 3rd edition, by Gray J.Brosin, cengagedelmar Learning India P.ltd publications.
3. Problem Solving with C by M.T Somashekara PHI publications.
4. C Programming Language", (2nd edition) by Brain W.Kernighan & Dennis Ritchie, ", PHI publication

E-learning resources

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering

Introduction to Electrical Circuits

EC1T6 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1period/week Semester end examination: 70 marks

Prerequisites

- Elementary concepts of Physics such as electricity and magnetism
- Basic concepts of Engineering Mathematics such as algebra, linear equations, trigonometry and differential equations.

Course Objectives

1. To learn the key concepts and laws of electricity and magnetism in a logical sequence.
2. To learn the properties of passive components and electric sources
3. To learn the applications of electric circuit reduction techniques
4. To learn the techniques of determination of parameters and behavior of an electric circuit for DC and AC excitations.

Course Outcomes

- Ability to practice the technical representation of common electrical and magnetic systems.
- Ability to use the passive components in electric and electronic circuit design
- Ability to apply techniques to reduce any complex electric circuit to an appropriate form.
- Ability to use techniques to evaluate the parameters of an electric circuit excited by DC and AC sources.

UNIT-I

Introduction to Electrical Circuits: Concepts of charge, electric current, Force, work. Electrical power, electrical potential and e.m.f. Passive and active elements, resistance and resistivity, temperature coefficient of resistance, Ohm's Law. Sources- Ideal, practical, independent, dependent and Source transformation, Electric circuits: Nodes, Branches and Loops, Series resistors and voltage division, parallel resistors and current division, Kirchoff's Laws, Wye-Delta transformation.

Capacitors and capacitance: Electrostatic Fields, Capacitors, Electric flux density, Permittivity, Parallel plate capacitor, Capacitors connected in parallel and series, Energy stored in a capacitor.

UNIT-II

Magnet circuits: Magnetic fields, Magnetic flux and flux density, field strength, Permeability, Electromagnetism, mmf, Reluctance, Inductance -self and mutual inductances,

coefficient of coupling, dot convension, energy stored in an inductor, inductances in series and parallel, Composite series magnet circuits, Comparison between electrical and Magnetic quantities.

UNIT-III

AC Fundamentals: Generation of alternating voltage sine wave, Types of waveforms: Square wave, saw-tooth wave, Triangular wave, Frequency, phase angle, wavelength, Peak, average, RMS values, Form factor and peak factor of ac periodic waveforms.

Phasors and Complex quantities: Introduction, phase representation of alternating voltage, addition, subtraction of phasors, polar and rectangular form, j-operator: Multiplication and division of complex quantities.

UNIT-IV

Single phase series a.c circuits: Purely resistive a.c circuit, purely inductive a.c circuit, purely capacitive circuit, R-L series a.c circuit, R-C series a.c circuit, R-L-C series a.c circuit, concept of reactance, impedance and admittance.

Single phase parallel a.c circuits: R-L parallel a.c circuits, R-C parallel a.c circuit, L-C parallel a.c. circuit L-R-C parallel a.c. circuit.

UNIT –V

Resonance: series resonance, tuning for resonance, Q-factor, selectivity and bandwidth of a series resonant circuit. Parallel resonance: Q factor for parallel L-C circuits, Resonance frequency for parallel L-C circuits. Related problems

Learning Resources

Text Books:

1. Electrical Circuit Theory and Technology- John Bird, Elsevier, Revised Ed., 2001
2. Electric Circuits – David A Bell, Oxford University Press, 7th Ed., 2009.
3. Electric Circuits- A. Sudhakar & Shyammohan S. Palli, Tata Mc-Graw- Hill,2005
4. Principles of Electrical Engineering, V.K Mehta, S.Chand Publications, 11th Ed., 2010.

References:

1. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N.O.Sadiku, Tata Mc-Graw- Hill, 4th Ed., 2012.
2. Circuit Theory, A.Chakrabarti, Dhanpat Rai.,New Delhi, 2008.

E-learning resources:

1. http://nptel.ac.in/courses.php,
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering
English Language Communication Skills Lab

EC1L1 **Credits: 2**
Lab: 3 periods/week Internal assessment: 25 marks
Tutorial:-- Semester end examination: 50 marks

Course Objectives

- To improve the communicative ability.
- To enhance the general conversational skills in different socio-cultural contexts.
- To strengthen their professional skills.
- To instill confidence and make them competent enough to express themselves fluently.
- To expose the students to various spoken skills.

Course outcomes

- Better pronunciation and accent
- Ability to use functional English
- Improved comprehensive ability
- Enhanced analytical skills
- Good negotiation skills.

List of Experiments

Task 1:
Phonetics: Introduction to sounds of English. Phonetic transcription of simple words. Word stress or accent. Intonation.

Task II:
Spoken skills: JAM, Public speaking, Debate

Task III
Conversation skills: Introducing Extending Invitations Apologizing Lodging complaints.

Task IV
Describing: Describing an object, Describing a process, Describing situations

Task V
Group Discussion: Dynamics of Group Discussion,
Various strategies Discussion on various topics

Learning Resources

Reference books:

1. Everyday dialogues in English------Robert J.Dixon.
2. Speak well------orient black swan.

Electronics & Communication Engineering
Engneering Physics & Chemistry Lab

EC1L2 **Credits: 2**

Lab: 3 periods/week Internal assessment: 25 marks

Tutorial:--- Semester end examination: 50 marks

Course Objectives

(A) ENGINEERING PHYSICS LAB

The entire course is designed to have the knowledge of properties of matter ,sound ,optics , electricity and magnetism and electronics .

- Students will learn to determine elastic modulai .
- Students will learn to determine wavelength of source using grating.
- Students will know the procedure to determine radius of curvature of a lens.
- Students will learn the procedure to determine time constant of RC Circuits.
- Students will have the knowledge about zener diode by drawings V-I Characteristics .
- Students will learn to determine the energy gap of a semi conductor.

(B) ENGINEERING CHEMISTRY LAB

To make student

- Familiar with quality and parameters of water samples, useful for drinking,effluent treatment and agriculture purposes.
- Aware of preparation of some thermosetting plastic like Bakelite.

Course Outcomes

(A) ENGINEERING PHYSICS LAB

- After completion of the course the student will be able to understand mechanical properties and determine the rigidity modulus.
- Comprehend optical phenomena such as interference and diffraction and calculate the wavelength and radius of curvature of planoconvex lens.
- Acquire the knowledge of electronic principles and evaluate the time constant, energy band gap and Zener breakdown.

(B) ENGINEERING CHEMISTRY LAB

At end of the course the student is able to

- Determine parameters like hardness , alkalinity, turbidity and D.O of water sample which are useful for domestic, agriculture and industrial purposes.
- Understand nature of the soil from PH values which is useful for agriculture.
- Prepare plastics like Bakelite and understand their applications in industin various industries.

List of experiments

A) Engineering Physics Lab

1. Determination of rigidity modulus of the given wire using Torsional Pendulum.
2. Determination of wavelength of a monochromatic source using Diffraction Grating.

3. Determination of radius of curvature of a given plano convex lens by Newton Rings method.
4. Determination of time constant of a R-C Circuit.
5. Draw the Zener Diode V-I Characteristics and determine the breakdown voltage .
6. Determination of band gap of a Semiconductor using p-n junction diode.

B) Engineering Chemistry Lab

1. Determination of Total Hardness of water sample using EDTA.
2. Determination of Total alkalinity of water sample.
3. Determination of D.O. in water.
4. Measurement of Turbidity of water sample.
5. PH of Soil and fruits.
6. Preparation of Phenol-Formaldehyde resin.

Electronics & Communication Engineering
C Programming Lab

EC1L3 **Credits: 2**

Lecture Hours: -- Internal Assessment: 25 marks

Lab Hours: 3 Semester end examination: 50marks

Course Objectives:

- To make the student learn a programming language.
- To learn problem solving techniques.
- To teach the student to write programs in C and to solve the problems.

Course Outcomes:

After Completion of this course the student would be able to

- Read, understand and trace the execution of programs written in C language.
- Write the C code for a given algorithm.
- Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
- Write programs that perform operations using derived data types.

Course Contents / Syllabus

Exercise1: Basics

1. Write a program to print sample strings like "hello world", "Welcome to C Programming" with different formats using escape sequences.
2. Write a Program to print different data types in 'C' and their ranges.
3. Write a Program to initialize, assignment & printing variables of different data types.

Exercise2: Operators

1. Write a Program to demonstrate arithmetic operators. (+,-,*,/,%)
2. Write a Program to demonstrate logical operators. (Logical AND, logical OR)
3. Write a Program to read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
4. Write a Program to calculate simple interest.
5. Write a Program to convert temperature. (Fahrenheit –Centigrade and vice-versa)

Exercise3: Operators

1. Write a Program to demonstrate relational operators.(<,>,<=,>=,==,!=)
2. Write a program to check equivalence of two numbers using conditional operator.
3. Write a Program to demonstrate pre increment and post increment.(++a, a++ where a is a value to be initialized)

4. Write a Program to demonstrate pre decrement and post decrement.(--a, a--where a is a value to be initialized)
5. Write a program for computing the volume of sphere, cone and cylinder assume that dimensions are integer's use type casting where ever necessary.

Exercise4: Decision Statements

1. Write a Program to read marks of a student in six subjects and print whether pass or fail (using if-else).
2. Write a Program to calculate roots of quadratic equation (using if-else).
3. Write a Program to calculate electricity bill. Read starting and ending meter reading. The charges are as follows.

4. No. of Units Consumed	Rate in (Rs)
5. 1-100	1.50 per unit
6. 101-300	2.00 per unit for excess of 100 units
7. 301-500	2.50 per unit for excess of 300 units
8. 501-above	3.25 per unit for excess of 500 units

Exercise5: Switch operations

1. Write a Program to perform arithmetic operations using switch case.
2. Write a Program to display colors using switch case (VIBGYOR).
3. Write a Program to display vowels and consonants using switch case.
4. Write a Program to display names of days in a Week using switch case.

Exercise6: Basic Loop operations

Do the Following Programs Using for, while, do-while loops.

1. Write a program to calculate sum of individual digits of a given number.
2. Write a program to check whether given number is palindrome or not.
3. Write a program to print prime numbers in the given range.
4. Write a program to display multiplication tables from 1 to 10 except 3 and 5.

Exercise7: Advanced loops

1. Write a program to print the Fibonacci series for given 'N' value.
2. Write a program to check whether a given number is a Fibonacci number or not.
3. Write a program to read 2 numbers x and n then compute the sum of the Geometric Progression. $1+x+x^2+x^3+ \text{ - - - - - - - } +x^n$
4. Write a program to print the following formats.

```
 1                    *
1 2                   * *
1 2 3                 * * *
1 2  3 4              * * * *
```

Exercise8: 1-D arrays

1. Write a program to store 10 elements in the 1-D array and print sum of the array.
2. Write a program to print minimum and maximum elements in the 1-D array.
3. Write a program to count no. of positive numbers, negative numbers and zeros in the array.
4. Write a program to search the given element by using linear search.
5. Write a program to sort the given elements using bubble sort technique.

Exercise9: 2-D arrays

1. Write a program to perform matrix addition and matrix subtraction.
2. Write a program to perform matrix multiplication by checking the compatibility.
3. Write a program to print the transpose of a matrix.

Exercise10: Strings

1. Write a program to perform various string manipulations using built-in functions.
2. Write a program to print the given strings in ascending order.
3. Write a program to verify the given string is palindrome or not (without built-in functions, with using built-in functions).
4. Write a program to concatenate two strings using arrays.

Exercise 11: Math Functions and I/O Fucntions

1. Write a program to read values from keyboard and find the values using abs(),sqrt(),floor(),ceil()and pow().
2. Write a program to read and display a value using getch() and putch().
3. Write a program to read and display a value using getchar(), putchar(),gets() and puts().

Exercise 12: Functions

1. Write a program to find sum of two numbers using functions.
2. Write a program to find product of two numbers using functions without arguments, without return type.
3. Write a program to find difference of two numbers using functions without arguments, with return type.

4. Write a program to find sum of two numbers using functions with arguments &without return type.
5. Write a program to find product of two numbers using functions with arguments, with return type.

Exercise13: Functions and Recursion

1. Write a program to swap two numbers using
2. Call By Value B) Call By Reference.
3. Write a program to calculate factorial, gcd using recursion and non-recursion functions.
4. Write program to perform arithmetic operations using pointer.
5. Write a program matrix addition using pointers.

Exercise14: Structures

1. Write a program to create structure for an account holder in a bank with following
2. Fields: name, account number, address, balance and display the details of five account holders.
3. Write a program to find total marks of individual student and average marks for 10 students using structures.
4. Write a program to create structure called traveler and members of structure are train no, coach no, seat no, source ,destination , gender, age, name and departure date.
5. Write a program to illustrate passing an entire structure to a function.

Exercise15: File operations using command line arguments

1. Write a program which copies the contents of one file to another file using command line arguments.
2. Write a program to reverse the first n characters in a file use command line arguments.

Learning Resources

References

1. Problem Solving and Program Design in C, 4th edition, by jeri R. Hanly and Elli B.Koffman.
2. Programming in C by Pradip Dey, Manas Ghosh 2nd edition Oxford University Press.
3. E.Balaguruswamy, Programming in ANSI C 5th Edition McGraw-Hill
4. A first book of ANSI C by Gray J.Brosin 3rd edition Cengagedelmer Learning India P.Ltd
5. AL Kelly, Iraphol,Programming in C,4th edition Addison-Wesley – Professional
6. Brain W.Kernighan & Dennis Ritchie, C Programming Language, 2nd edition, PHI

Electronics & Communication Engineering

Engineering Mathematics -II

EC2T1 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives

- After completion of this course engineers will be able to apply the concepts of matrices, Laplace transforms, Fourier series, Fourier transforms in solving engineering problems.
- Linear algebra in the course cover material which is essential to anyone who does mathematical computation in Engineering and sciences.

Course Outcomes

- students able to solve system of Linear equations, be familiar with properties of matrices, find the inverse, Eigen values and Eigen vectors and use them in diagonalization,
- Acquire knowledge in Laplace transforms, inverse Laplace transforms and how to get a solution of differential equations by using Laplace transforms.
- Get knowledge of expanding a function in terms of sine and cosine functions' in Fourier series and also to get knowledge in Fourier transforms.
- Get knowledge in Z-transforms, inverse Z-transforms, solving difference equations

UNIT – I

Matrices and Linear systems of equations: Rank-Echelon form, Normal form-definition of a vector, linear independence – Solution of Linear System of equations – Direct Methods-Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.

UNIT – II

Eigen values - Eigen vectors: Eigen values - Eigen vectors - Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- some applications of eigen value problems- Diagonalization of a matrix.

UNIT – III

Laplace transforms & Inverse Laplace transforms

Laplace transforms: Laplace transforms of standard functions –Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function.

Inverse Laplace transforms: Convolution theorem - Application of Laplace transforms to ordinary differential equations with given initial conditions.

UNIT – IV

Fourier Series and Fourier transforms:

Fourier series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

Fourier transforms: Fourier integral theorem (only statement) – Fourier sine and cosine integrals - Fourier transform – sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT – V

Z-transforms: Introduction, properties of Z-transforms-initial value theorem-final value theorem- inverse Z-transforms-applications to difference equations.

Learning Resources

Text Books:

1. Higher Engineering Mathematics – Khanna Publishers – B.S. Grewal – 42nd Edition.
2. Advanced Engineering Mathematics – Wiley – Erwin Kreyszig- 8th Edition.

References:

1. Engineering Mathematics Vol-II, Iyengar,T.K.V, Krishna Gandhi, et.al S.Chand Co. New Delhi.

E-learning resources:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering
Professional Ethics

EC2T2 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial:--- Semester end examination: 70 marks

Course Objectives

1. To inculcate the sense of social responsibility.
2. To develop a firm ethical base
3. To make the students realize the significance of ethics in professional environment.

Course Outcomes

- Improved knowledge of ethics
- High sense of responsibility
- Environmental awareness
- Professional outlook
- Developing a broad culture.

UNIT I

Profession-----Definition
Three types of ethics.
Engineering ethics
Rights and responsibilities of an engineer.

UNIT II

Evolution of engineering ethics
Code of ethics
Kohlberg's theory
Gilligan's theory

UNIT III

Engineering as social experimentation
Engineer's social responsibility

UNIT IV

Computer ethics
Ethical hacking
Privacy

UNIT V

Environmental ethics.
Livable environment
Technology assessment.

Learning Resources

References

1. Ethics in engineering: Mike W.Martin Roland, Mac Grow Hill.Schinzinger
2. Engineerinethics-----M.Govindarajan, S.Natarajan&V.S.Senthil Kumar.
3. Eastern economy Edn.PHI
4. Engineering ethics---Harris pitch and Rabbins, cengage.
5. Caroline whit back---Ethics in engineering practice and research-----Cambridge.

E-learning Resources

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering

Elements of Mechanical Engineering

EC2T3 **Credits: 3**

Lecture: 3 periods/week Internal Assessment: 30marks

Tutorial: 1 period/week Semester end examination: 70 marks

Course Objectives

- To introduce basic knowledge about special casting, molding procedures and different welding techniques used in industry.
- To impart basic knowledge on simple stresses & strains, Properties of materials.
- To impart basic knowledge on centroids& Moment of Inertia of plane Figures.
- To impart basic knowledge on basics of thermodynamics and Laws of thermodynamics.
- To teach the working principle of Internal Combustion Engines.

Course Outcomes:

- Familiarize students with some of the special casting and molding procedures used in industry and different welding techniques with their respective applications.
- Acquainted the students regarding simple stress and strains and their material properties.
- Attain basic knowledge on centroids& Moment of Inertia of plane Figures.
- Awareness on basics of thermodynamics and Laws of thermodynamics.
- Imparted knowledge about IC Engines, External combustion Engines.
- Knowledge of Refrigeration and air conditioning systems, which is playing prominent role in the present day industry.

UNIT-I

Casting: Introduction, General method in making a Casting, pattern: types, materials and allowances. Moulding materials and equipment, Preparation, properties of moulding sands.

Welding: Principles of gas welding and arc welding, Soldering and Brazing.

UNIT-II

Simple Stress and Strains: Elasticity and Plasticity – Types of stresses & strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain- Elastic moduli & the relationship between them.

Properties of Materials: Physical properties - Mechanical properties – Electrical properties, Magnetic Properties and Chemical properties.

UNIT-III

Centroids: Introduction, Determination of centroid for plane figures rectangle and Triangle, Centroids of composite plane figures for I section, L section & T section only.

Moment of Inertia of Plane Figures: Moment of Inertia of a plane figure with respect to an axis in its plane – Moment of inertia with respect to an axis perpendicular to the plane of the figure – Parallel axis theorem --- Moment of Inertia of I section, L section & T section only.

UNIT-IV

Basics of Thermodynamics: Introduction and definition of thermodynamics, Dimensions and units, systems, surroundings and universe, Reversibility and Irreversibility, Quasi-static process, Energy, Heat and Work.

Introduction to Law of Thermodynamics: Zeroth Law of Thermodynamics, First law of thermodynamics and Second law of thermodynamics.

UNIT-V

IC Engines: Introduction, Main components of IC engines, working of 4-stroke petrol engine and diesel engine, working of 2- stroke petrol engine and diesel engine, difference between petrol and diesel engine, difference between 4- stroke and 2- stroke engines.

Learning Resources

Text books:

1. Fundamentals of Mechanical Engineering / G.S.Sawheny- PHI.
2. An Integrated Course in Mechanical Engineering / R.K.Rajput /Birala Publications.
3. I.C. Engines / V. GANESAN- TMH.
4. Strength of Materials by R.K. Rajput, S.Chand & Company.
5. Thermal Engineering / R.K. Rajput / Lakshmi Publications.

References:

1. Thermodynamics and Heat Engines / R. Yadav / Central Book Depot.
2. Strength of Materials by R.K.Bansal, Laxmi Publishers.
3. Engineering Mechanics Statics and dynamics by A.K.Tayal, Umesh Publication, Delhi.
4. Fundamentals of I.C.Engines - P.W. Gill, J.H. Smith & Ziurys- IBH & Oxford pub.

E-learning resources:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering

Environmental Studies

EC2T4 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial:--- Semester end examination: 70 marks

Course Objectives:

- To develop an awareness, knowledge, and appreciation for the natural environment.
- To understand different types of ecosystems exist in nature.
- To know our biodiversity.
- To understand different types of pollutants present in Environment.
- To know the global environmental problems.

Course Outcomes:

The student will be able to

- Develop an appreciation for the local and natural history of the area.
- Hope for the better future of environment in India which is based on many positive factors like Biodiversity, successive use of renewable energy resources and other resources, increasing number of peoples movements focusing on environment.
- Know how to manage the harmful pollutants.
- Gain the knowledge of Environment.
- Create awareness among the youth on environmental concerns important in the long term interest of the society

UNIT – I

Natural Resources:

A)Forest resources – Use and over – exploitation, deforestation, case studies – Timberextraction – Mining, dams and other effects on forest and tribal people.

Water resources - Use and over utilization of surface and ground water –Floods, drought, conflicts over water, dams - benefits and problems.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosionand desertification.

B) Energy resources: Renewable and non-renewable resources-Natural resources and associated problems growing energy needs, renewable and non-renewable energy sources useof alternate energy sources. Case studies.

Mineral resources: Use and exploitation problems, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing,\effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, casestudies. Organic Farming, Bio fertilizers and Bio-pesticides

UNIT – II

A) Ecosystems: Definition, Scope and importance, Concept of an ecosystem. - Structure and function of anecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem -Ecological succession. - Food chains, food webs and ecological pyramids, Flow of energy,Bio-geochemical cycles, Bio-magnification, Ecosystem values, Services and carryingcapacity.

B)Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographicalclassification of India, India as a mega-diversity nation, Hot-sports of biodiversity, Value ofbiodiversity: consumptive use, productive use, social, ethical, aesthetic, option values andecosystem service values. Threats to biodiversity: habitat loss, poaching of wildlife, manwildlifeconflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - III

A) Environmental Pollution: Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards

B) Solid waste Management: - Classification and characters of solid waste, factors affecting waste generation, collection and disposal of solid waste. E- waste and management. Role of an individual in prevention of pollution. – Pollution case studies.

UNIT – IV

A) Global Environmental problems and Global efforts: Green house effect, Green house gasses, Global warming, Climate change and their impactson human environment, ozone layer depletion. International conventions / protocols: Earthsummit, Kyoto protocol & Montreal protocol.

B) Towards Sustainable Future: From Unsustainable to Sustainable development, Population and its explosion, Urban problems related to energy,Consumerism and waste products, Roleof IT in Environment and human health. Value Education. HIV/AIDS, Environmental ethics, Concept of green buildings and Clean Development Mechanism.

UNIT – V

A) Environmental Impact Assessment & Management plans, Environmental Law: Definition ofimpact, Classification of impacts, Impacts of different components such as: human health, resources, air, water, flora & fauna. Environment management plans (EMP): Technological solutions for pollution control, Green-belt-development, Rain water harvesting, remote sensing and GIS methods. Environmental law (Air, Water, Wild life,

Forest Acts): Objectives of Acts, Institutional arrangements for Implementation and Regulation.

B) Field work: Visit to a local area to document environmental assets River /forestgrassland/hill/mountain-Visit to a local polluted site Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems pond, river, hill slopes, etc.

Learning Resources

Text Books:

1. Erach Bharucha, 2010 "Text Book of Environmental Studies", University GrantsCommission, Universities Press (India) Pvt.Ltd., Hyderabad
2. Text Book of Environmental Sciences and Technology by M. Anji Reddy, BS Publications.

Reference:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, CengageLearning.
2. Text Book of Environmental Science and Engineering by G.Tyler Miller Jr,2006 Cengage learning
3. Text Book of Environmental Studies from Crisis to Cure by R. RajaGopalan.
4. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada

E-learning resources:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering

Electronic Devices and Circuits

EC2T5 **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-Requisite: Semi Conductor Physics & Introduction to Electrical Circuits.

Course Objectives:

- To study the motion of an Electron under the influence of Electric & Magnetic fields.
- To study in detail about construction of several electronic devices.
- To analyze the characteristics of various electronic devices and circuits.

Learning Outcomes:

- Will get in-depth knowledge about the Semiconductor Devices like Diode, BJT,
- Uni-polar devices like JFET, MOSFET and UJT.
- Will be able to analyze rectifiers circuits.

UNIT-I

Electron Dynamics: Two Dimensional Motion of electron in an Electric Field, Electrostatic Deflection in Cathode ray Tube , Force in Magnetic Field, Motion in Magnetic Field, Magnetic Deflection in Cathode Ray tube, Cathode Ray Oscilloscope (CRO). Motion of electron in Parallel Electric & Magnetic Fields, Perpendicular Electric & Magnetic fields.

UNIT-II

Junction Diode Characteristics: Open circuited P N Junction, Forward and Reverse Bias, Current components in PN Diode, Diode current Equation,Volt-Amper Characteristics Temperature Dependence on V – I characteristic, Diffusion capacitance, Transition capacitance and Diode Resistance (Static and Dynamic), Energy Band Diagram of PN Diode, Avalanche and Zener Break Down, Zener Characterisitics, Tunnel Diode, Characteristics with the help of Energy Band Diagrams, Varactor Diode, LED, Photo Diode.

UNIT-III

Diode Circuits: Diode as a Rectifier, Halfwave Rectifier, Full wave Rectifier with Center-tapped Transformer, Bridge Full wave Rectifier, derivation of Ripple factor, Form factor, peak factor, Efficiency of Rectifiers. Filters – Capacitor, Inductor, LC and CLC filters, Comparison of filters.

UNIT-IV

Transistor Characteristics

Bi-polar Junction Transistor: Construction of BJT, Transistor current components, Transistor as an amplifier, Characteristics of Transistor in Common Base and Common

Emitter Configurations, Analytical expressions for Transistor Characteristics, Typical transistor junction voltage values, Photo Transistor

Field Effect Transistor: Advantages of FET over BJT, Classification of FET, JFET construction and working, MOSFET construction and working (Enhancement and depletion mode), UJT and its characteristics.

UNIT-V

Transistor Biasing

BJT Biasing and Thermal Stabilization: Operating point, Basic Stability, fixed bias, Collector to Base Bias, Self Bias circuits, Stabilization factors (S, S', S''), Bias Compensation, Thermistor and Sensitor compensation, Compensation against variations in V_{BE}, I_{co}. Thermal runaway, Thermal stability.

FET Biasing: Introduction, Fixed Bias, Self Bias, Voltage divider bias.

Learning Resources:

Text Books:

1. Electronic Devices and Circuits, J.Milliman, C.C Halkias, Tata Mc-Graw Hill, 2nd Edition, 2007
2. Integrated Electronics - J.Milliman, C.C Halkias, Tata Mc-Graw Hill, 2nd Edition, 2007

References:

1. Electronic Devices and Circuits, David A.Bell, Oxford, 5th edition, 2009.
2. Electronic Devices and Circuits Theory, Boyelstad, Pearson Education, 8th Edition, September 2011.

E-learning resources:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

Electronics & Communication Engineering
Engineering Drawing

EC2T6 **Credits: 3**

Lecture: 2 periods/week Internal assessment: 30 marks

Lab Practice: 4 periods /week Semester end examination: 70 marks

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Pre Requisites: Mathematics

Course Objectives

- Explain about conics, curves and orthographic projection of geometrical entities
- Transform orthographic to isometric projections and isometric to orthographic projections.

Course Outcomes:

At the end of course the student will be able to draw:

- Regular polygons and construct scales
- Various conics sections and curves.
- Orthographic projections of geometrical entities
- Orthographic views of sectioned solids
- Isometric views and orthographic views.

UNIT-I

Introduction to Engineering Drawing: Use of Drawing instruments, Dimensioning, Representation of various types of lines, Geometrical constructions.

Polygons-construction of regular polygons using given length of a side.

Scales: Construction and use of plain and diagonal scales.

Conic Sections: General construction method for ellipse, parabola and hyperbola. Special methods for conic sections.

Curves used in Engineering Practice - Cycloidal curves- Cycloid, Epicycloid and Hypocycloid.

UNIT – II

Projection of Points and Projection of Straight Lines: Projections of points; Projections of straight lines parallel to both the reference planes, parallel to one and inclined to other reference plane and inclined to both the reference planes; Determination of true lengths, angle of inclinations and traces.

Projections of Regular Planes: parallel to one reference plane and perpendicular to the other reference plane, parallel to one reference plane and inclined to other reference plane, perpendicular to both the reference planes, inclined to both the reference planes.

UNIT-III

Projections of Simple Solids: Cubes, Prisms, Pyramids, Cylinders and Cones with axis perpendicular to one reference plane and parallel to other reference plane, with axis inclined to one reference plane, with axis inclined to both the reference planes.

UNIT – IV

Section of Solids: Cubes, Prisms, Pyramids, Cylinders and Cones- True shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).

UNIT –V

Transformation of Projections:

Principles of Isometric Projection – Isometric Scale – Isometric Views–Isometric Views of Lines, Plane Figures, Conversion of Isometric Views to Orthographic Views – Conversion of Orthographic Views to Isometric Views. (Treatment limited to simple objects)

Learning Resources

Text Books:

1. Engineering Drawing, by N.D. Bhat V.M. Panchal, (48thEdition), Charotar publishers, 2005.
2. Engineering graphics with Auto CAD", by R.B. Choudary, Anuradha Publishers, 2002.
3. Engineering Drawing, b y Narayana and Kannaiah Scietech publishers, 2009.

References:

1. Engineering Drawing and Graphics, by Venugopal, New age publications, 2007.
2. Engineering Drawing, by Johle, Tata Macgraw Hill.2004.
3. Computer Aided Engineering Drawing, (3^{ed} edition), by Trymbaka Murthy, I.K.International publications.

Electronics & Communication Engineering
IT Workshop

EC2L1 **Credits: 2**

Lab: 3Hours /week Internal assessment: 25 marks

Tutorial:--- Semester end examination: 50marks

Prerequisite: Basic Knowledge on Computers.

Course Objectives:

- To provide students with hands-on experience in basic hardware, productivity tools and basic operating system installations.

Course Outcomes:

After Completion of this Course the Student would be able to

- Identify the basic computer peripherals.
- Gain sufficient knowledge on assembling and disassembling a PC.
- Learn the installation procedure of Windows and Linux OS.
- Acquire knowledge on basic networking infrastructure.
- Learn productivity tools like Word, Excel and Power point.
- Acquire knowledge on basics of internet and worldwide web.

Task 1:

Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

Task 2:

A practice on disassembling the components of a PC and assembling them.

Task 3:

Basic DOS commands, Installation of MS windows.

Task 4:

Introduction to Linux- Installation Procedure, Basic Linux Commands.

Task 5:

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals).

Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues.

Task 6:

Demonstrating Importance of Networking, Transmission Media, Networking Devices Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

Task 7:

MS Word Orientation: Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

Task 8:

Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Task 9:

Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations **Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text LOOKUP/VLOOKUP

Task 10:

Performance Analysis - Features to be covered: - Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Task 11:

Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

Task 12:

Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email, Customizing web browsers using bookmarks, search toolbars and pop up blockers, Search engines and their usage.

Learning Resources

References:

1. Computer Fundamentals, Anita Goel, Pearson
2. Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.
3. Introduction to Information Technology-ITL Education Solution Limited- Pearson.
4. Fundamentals of Itnformation Technology, 2nd Edition, Alexis Leon, Mathews Leon, (Leon Vikas).

Electronics & Communication Engineering
Electronic Devices and Circuits Lab

EC2L2 **Credits: 2**

Lab : 3 periods/week Internal assessment: 25 marks

Tutorial:--- Semester end examination: 50 marks

Course Objectives:

- To study basic electronic components
- To observe characteristics of electronic devices

Learning Outcomes:

At the end of the course the students can able to

- Measure voltage, frequency and phase of any waveform using CRO.
- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
- Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers.

List of Experiments

PART A: (Only for viva voce Examination)
Electronic Workshop Practice (in 6 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.
3. Soldering practice – Simple Circuits using active and passive components.
4. Single layer and Multi layer PCBs (Identification and Utility).
5. Study and operation of
   - Millimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - Study and Operation of CRO.

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

1. PN Junction diode characteristics A. Forward bias B. Reverse bias.(cut-in voltage & Resistance Calculations)
2. Zener diode characteristics and Zener as a regulator

3. Transistor CB characteristics (Input and Output) & h Parameter calculations
4. Transistor CE characteristics (Input and Output) & h Parameter calculations
5. Rectifier without filters (Full wave & half wave)
6. Rectifier with filters (Full wave & half wave)
7. FET characteristics
8. SCR Characteristics
9. UJT Characteristics
10. CE Amplifier
11. CC Amplifier (Emitter Follower)

Electronics & Communication Engineering
Engineering Workshop

EC2L3 **Credits: 2**
Lecture: -- Internal assessment: 25 marks
Lab Practice: 3 periods/wee Semester end examination: 50 marks

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Course Objectives

- Illustrate about basic hand tools used in various trades such as Carpentry, Tin-Smithy, Fitting House wiring, Black smithy.
- Imparting skills to prepare basic joints in Carpentry.
- Imparting skills to fabricate various objects by using sheet metal.
- Know various basic house wiring connections.
- Imparting skills to fabricate various shapes by using black smithy.

Course Outcomes

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

- Prepare basic joints used in carpentry
- Prepare edges for better joint for fitting
- Perform basic house wiring connections
- Prepare various shapes and objects by using Tin smithy and Black smithy.

List of Experiments

Note: Any two experiments from each trade

TRADE:

CARPENTRY	1. T-Lap Joint
	2. Cross Lap Joint
	3. Dovetail Joint
	4. Mortise and Tennon Joint
FITTING	1. Vee Fit
	2. Square Fit
	3. Half Round Fit
	4. Dovetail Fit

BLACK SMITHY	1. Round rod to Square
	2. S-Hook
	3. Round Rod to Flat Ring
	4. Round Rod to Square headed bolt
HOUSE WIRING	1. Parallel / Series Connection of three bulbs
	2. Stair Case wiring
	3. Florescent Lamp Fitting
	4. Measurement of Earth Resistance
TIN SMITHY	1. Taper Tray
	2. Square Box without lid
	3. Open Scoop
	4. Funnel

Learning Resources

Text Books:

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition

Electronics & Communication Engineering

EC3T1 Engineering Mathematics – III Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- Students learn to find approximate root of algebraic and transcendental equations and get familiarity with interpolation.
- Students get good exposure to numerical differentiation and integration.
- Students acquire knowledge in basic concepts like continuous; differentiation; integration and also series expansions; Cauchy's integral theorem; different types of singularities and evaluation of real integrals.

Learning Outcomes:

Student will be able to

- Ability in approximating a root of algebraic and transcendental equations.
- Get the familiarity with interpolation and different interpolation formulae.
- Get knowledge in numerical solution of ordinary differential equations
- Get knowledge of analytic function, properties and to verify the given function is analytic or not, how to construct an analytic function when the real part or imaginary part is given
- Get knowledge about line integrals, evaluation of integrals using Cauchy's integral formula.
- Ability in expanding the given function in Taylor's series, Maclaurin's series, Laurent Series.
- Finding residues at singular points, able to evaluate improper integrals.
- Transformation of given curves by using some special transformations

UNIT- I

Solution of Algebraic and Transcendental Equations: Introduction – Bisection method – Method of false position – Iteration method – Newton-Raphson's method

Interpolation: Introduction- Errors in polynomial interpolation – finite differences- forward differences- backward differences – central differences – Symbolic relations -Differences of a polynomial - Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula.

UNIT - II

Numerical solution of Ordinary Differential equations: Solution by Taylor's series method - Picard's Method of successive approximations - Euler's Method - Runge-Kutta Methods – Predictor - Corrector Methods - Milne Thompsons's method.

UNIT - III

Functions of a complex variables: Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions –Milne Thompson method. Introduction to elementary functions.

UNIT - IV

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

Singular points – Isolated singular point – pole of order n – essential singularity.

UNIT - V

Residue – Evaluation of residues - Residue theorem - Evaluation of integrals of the type $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$, $\int_{-\infty}^{\infty} f(x)dx$.

Conformal mapping: Standard transformations - Translation, rotation, inversion - Transformation by e^z, lnz, z^2, z^n (n positive integer), sinz, cosz, $z+\frac{a}{z}$. and bilinear transformation - fixed point - cross ratio - properties - determination of bilinear transformation mapping 3 given points.

Learning Resouces

Text Books:

1. A Textbook on Mathematical Methods - Himalaya Publishing House- V. Ravindranath, P. Vijayalaxmi- 1st Revised Edition: 2011.
2. Higher Engineering Mathematics – Khanna Publishers – B.S. Grewal – 42nd Edition: 2012, June.
3. Engineering Mathematics (Volume – III) - S. Chand - T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad- 9th Revised Edition: 2012.

References:

1. Advanced Engineering Mathematics – Wiley – Erwin Kreyszig- 8th Edition: 2006
2. A Text Book of Engineering Mathematics – Tata McGraw Hill - B. V. Ramana- 3rd Edition: 2008
3. Text Book of Engineering Mathematics: Special Functions and Complex Variables– PHI – Shahanaz Bathul: 2008

Electronics & Communication Engineering

EC3T2 Probability Theory and Stochastic Process Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisite: Engineering Mathematics-I (EC1T1), Engineering Mathematics-II (EC 2T1)

Course Objectives:

- To acquire the fundamental knowledge in probability concepts
- To manage situations involving more than one random variable and functions of random variables in engineering applications.
- To understand the principles of random signals and random processes
- To be acquainted with systems involving random signals and to analyze the response of random inputs to linear time invariant systems

Learning Outcomes:

After successful completion of the course, Graduates shall be able to

- Define probability and interpret probability by modeling sample spaces.
- Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance
- Solve the problems involving multiple random variables.
- Apply the concepts of random process in communication and signal processing
- Evaluate response of a linear system to Random Process.

UNIT- I

Probability: Probability introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Types, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Baye's Theorem, Independent Events, Bernouli Trails.

UNIT- II

The Random Variable: Definition of a Random Variable- Types, Conditions, Distribution and Density functions, Properties, Types, Examples, Conditional Distribution and Density, Properties.

Operations on One Random Variable: Expectation, Moments, Chebychev's Inequality, Marcov's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable

UNIT- III

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties, Conditional Distribution and Density, Statistical Independence, Sum of Random Variables, Central Limit Theorem.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables

UNIT- IV

Random Processes –Temporal Characteristics: The Random Process Concept, Classification, Distribution and Density Functions, Stationarity and Independence, Time Averages and Ergodicity, Correlation Functions and their Properties, Covariance Functions, Gaussian Random Process, Poisson Random Process.

Spectral Characteristics: The Power Spectrum: Properties, the Cross-Power Density Spectrum, Properties, Relationship between Power Spectrum and Correlation Functions.

UNIT- V

Linear Systems with Random Inputs: Random Signal Response of Linear Systems, Spectral Characteristics of System Response, Band pass, Band-Limited and Narrowband Processes, Properties, Modeling of Noise Sources

Learning Resources

Text Books:

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.

References:

1. Probability, Random Variables and Stochastic Processes – A. Papoulis and S. Unnikrishna Pillai, PHI, 4th ed., 2002.

2. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003.

3. Probability Methods of Signal and System Analysis. George R. Cooper, Clave D. MC Gillem, Oxford, 3rd ed., 1999

4. Signals, Systems & Communications - B.P. Lathi, B.S. Publications, 2003.

5. Communication Systems Analog & Digital – R.P. Singh and S.D. Sapre, TMH, 1995.

Electronics & Communication Engineering

EC3T3 **Signals and Systems** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period/week Semester end examination: 70 marks

Prerequisites: Engineering Mathematics (EC1T1)

Course Objectives:

- To introduce the basic concepts of signals, system classification and system modeling.
- To understand time-domain and frequency-domain approaches to the analysis of continuous and discrete-time systems.
- To provide necessary tools and techniques to analyze various systems.
- To Develop Mathematical and computational skills needed in application areas like Communications and Signal processing.

Learning Outcomes:

Student will be able to

- Analyze various signals and systems in time domain and frequency domain.
- Determine the response of an LTI system to arbitrary input signals.
- Apply the concepts of Fourier series, Fourier Transform and Laplace transforms to solve engineering problems.
- Sample and Reconstruct Signals.

UNIT- I

Introduction: Transformations of Independent Variables, Basic Continuous Time Signals, Basic Discrete Time Signals, Systems, Properties of Systems, Linear Time-Invariant (LTI) Systems, Convolution Sum, Convolution Integral, Properties of LTI Systems.

UNIT- II

Fourier analysis of Continuous-time signals: Fourier series, Convergence of Fourier series, Trigonometric and Exponential Fourier series, Fourier Transform, Properties of Fourier Transform, Fourier transform of periodic signals, Frequency Response Characterized by Linear Constant Co-efficient Differential Equations.

UNIT- III

Laplace Transforms: Introduction, Region of convergence (ROC) for Laplace transforms, Constraints on ROC for various classes of signals, Properties of Laplace Transforms, Inverse Laplace transform, Relation between Laplace transform and Fourier transform.

UNIT- IV

Fourier analysis of Discrete-time signals: Discrete Fourier Series, Discrete-time Fourier Transform (DTFT), Periodic Signals and DTFT, Properties of DTFT.

UNIT- V

Z-Transforms: Definition, Region of Convergence of Z-transform, Properties of Z-Transform, Inverse Z Transform, Analysis of LTI systems using Z Transforms.

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

Learning Resources

Text Books:

1. Signals and Systems – Alan V Oppenheim, Alan S Willsky and Young, PHI/Pearson, 2003.

References:

1. Fundamentals of Signals and Systems - Michel J. Roberts, MGH International Edition, 2008.

2. Signals & Systems - Simon Haykin and Van Veen,Wiley India Pvt Ltd, 2nd Edition, 2007.

Web Resources:

1. http://www.cdeep.iitb.ac.in/nptel/Electrical%20&%20Comm%20Engg/Signals%20and %20System/TOC-M1.htm
2. http://www.stanford.edu/~boyd.ee102
3. http://www.ece.gatech.edu/users/bonnie/book
4. http://ocw.mit.edu

Electronics & Communication Engineering

EC3T4 **Network Analysis and Synthesis** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1period/week Semester end examination: 70 marks

Prerequisites: Engineering Mathematics –II (EC2T1), Introduction to Electrical Circuits (EC1T6)

Course Objectives:

- To learn the concepts of mesh, node analysis, and network theorems.
- To learn the graphical representation of a network , transient analysis and application of Laplace transforms to RLC circuits.
- To learn the concepts of two port network parameters and different types of networks
- To learn the concepts of network functions.
- To learn the synthesis for a given network.

Course Outcomes:

Student will be able to

- Apply mesh, nodal analysis to complex circuits and express them using Thevenin's and Norton's equivalent forms
- Evaluate the performance of RL, RC, and RLC circuits by the application of Laplace transform.
- Analyze the given network using different two port network parameters.
- Determine the response of a network using network functions.
- Synthesize Network functions.

UNIT I

Network Theorems (Application to d.c & a.c analysis): Mesh analysis, Node analysis, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer Theorem, Reciprocity Theorem, Millman's Theorem, Tellegen's Theorem, Substitution Theorem and Compensation Theorem.

UNIT II

Network Topology : Graph of a network, Definitions associated with a graph, Incidence matrix, Loop matrix, Cutset matrix, Relationship among submatrices of A, B and Q. Relation between branch voltage matrix V_b, Twig voltage matrix V_t, and Node voltage matrix V_n, Relation between Branch current matrix I_b, and loop current matrix I_l, Network Equilibrium Equation, Duality.

Transient Analysis: Initial conditions, Resistor-Inductor Circuit, Resistor-Capacitor Circuit, Resistor-Inductor-Capacitor Circuit. Applications of Laplace Transforms to transient

analysis: The transformed circuit, Resistor-Inductor circuit, Resistor-Capacitor circuit, Resistor-Inductor-Capacitor circuit, Response of RL circuit to various functions, Response of RC circuit to various functions.

UNIT III

Two-Port Networks: Open-circuit impedance parameters, Short circuit admittance parameters, Transmission parameters, Inverse transmission parameters, Hybrid parameters, Inverse hybrid parameters, Inter relationship between the parameters, Inter connection of two port networks, T-Network, π network, lattice networks, terminated two port networks.

UNIT IV

Network Functions: Driving point Functions, Transfer functions, analysis of ladder networks, Analysis of Non-ladder networks, poles and zeros of network functions, Restrictions on pole & zero location for driving point functions, Restrictions on pole & zero locations for transfer functions, time-domain behavior from the pole-zero plot, graphical method for determination of residue.

UNIT V

Network Synthesis: Introduction, Hurwitz polynomials, Positive Real Functions, Elementary synthesis concepts, Realization of LC Functions, Realization of RC Functions, Realization of RL Functions.

Learning Resources

Text Books:

1. Engineering Circuit Analysis - William Hayt and Jack E.Kimmerley, McGraw Hill Company,6th edition
2. Network Analysis - M.E.Van Valkenburg, Prentice-Hall of India Private Ltd.

References:

1. Introduction to Modern Network Synthesis - M.E. Van Valkenburg, Wiley India Limited, 2nd Edition, 1986.
2. Theory & Problems of Electric Circuits - Joseph A Edminister, Schuam Series.
3. Network Analysis & Synthesis - Ravish R Singh, Tata McGraw- Hill Publications, 1st Edition, 2013
4. Networks & Circuits - A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill Publications, 4th Edition

Web Resources:

1. http://nptel.iitm.ac.in/video.php?subjectId=108102042
2. http://freevideolectures.com/Course/2350/Networks-Signals-and-Systems/33

Electronics & Communication Engineering

EC3T5 **Electrical Technology** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Pre-Requisite: Basic knowledge of circuit analysis techniques, Electromagnetic Induction Principle

Course Objectives:

- To understand principle of operation of AC and DC machines
- To study the performance of AC and DC machines
- To Study Different types of instruments for measuring AC and DC quantities

Learning Outcomes:

Student will be able to

- understand the principle of operation of AC and DC machines
- know the testing of AC , DC machines and transformers
- evaluate the measurement of basic electrical quantities

UNIT- I

DC Machines: Construction of a D.C Machine – Principle of operation as a Generator and Motor - EMF equation – Types of generators – Magnetization and load characteristics of DC generators – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Speed control of DC shunt motor – Flux and Armature voltage control methods – Losses and efficiency – Swinburne's Test.

UNIT- II

Transformers: Construction and principle of operation of single phase transformer – Phasor diagram on No Load and Load – Equivalent circuit – Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT- III

Induction Machines: Construction and principle of operation of three-phase induction motors – Slip ring and Squirrel cage motors – Slip-Torque characteristics– Principle of operation of single phase induction motors - Shaded pole motors – Capacitor motors – Stepper Motors – Characteristics

UNIT- IV

Three Phase Alternators: Alternators – Constructional features – Principle of operation –

Types - EMF Equation – Distribution and Coil span factors –Determination of Regulation of alternator by synchronous impedance method

UNIT- V

Electrical Instruments: Basic Principles of indicating instruments – Moving Coil, Moving iron Instruments (Ammeters and Voltmeters) - Extension of range of Ammeters & Voltmeters – Dynamometer type Wattmeter & Energy meter.

Learning Resources

Text Books:

1. Fundamentals of Electrical Engineering, Ashfaq Husain
2. Principles of Electrical Engineering, V.K. Mehta and Rohit Mehta, 1st edition, 2012
3. Basic Electrical Engineering , Nagsarkar,Sukhija, Oxford Publications,2nd edition, 2009

References:

1. Basic Electrical Engineering, M.S.Naidu and S.Kamakshiah,TMH Publications, 1st Edition, 2009
2. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI Publications, 2rd Edition, 2009
3. A Text Book of Electrical Technology Vol.II , B.L.Theraja, A.K.Theraja

Electronics & Communication Engineering

EC3T6 Switching Theory and Logic Design Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period/week Semester end examination: 70 marks

Prerequisites: ---

Course Objectives:

- To introduce the basic concepts of binary codes, error detecting and correcting codes.
- To study the representation of switching functions using Boolean expressions and their minimization techniques.
- To design and realize various combinational circuits, synchronous and asynchronous sequential logic circuits.
- To analyze various synchronous and asynchronous sequential logic circuits.

Learning Outcomes:

Student will be able to

- Identify the features of various number systems and binary codes.
- Apply the concepts of Boolean algebra for the analysis & design of various combinational & sequential logic circuits.
- Design various digital circuits starting from simple ordinary gates to complex programmable logic devices & arrays.
- Analyze various synchronous and asynchronous sequential circuits.

UNIT- I

Number Systems and Binary Codes: Philosophy of number systems, complement representation of negative numbers, binary arithmetic, binary codes, error detecting & error correcting codes –Hamming codes.

Boolean algebra: Fundamental postulates of Boolean algebra, Basic theorems and properties.

UNIT- II

Switching Functions: Switching functions- Canonical and Standard forms, Algebraic simplification, Digital logic gates, Multilevel NAND/NOR realizations, Minimization of switching functions using K-Map up to 5-variables, Tabulation Method, Prime Implicant chart.

UNIT- III

Combinational Logic Circuits: Adders, Subtractors, Parallel Binary Adder, BCD adder, Encoder, Decoder, Multiplexer(MUX), Demultiplexer, MUX Realization of switching functions, Parity generator, Magnitude Comparator, Code converters, PROM, PLA, PAL, Realization of switching functions using PROM, PLA and PAL.

UNIT- IV

Sequential Logic Circuits: Classification of sequential circuits (synchronous and asynchronous), Basic flip-flops (NAND RS latch, NOR RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals), Truth tables and excitation tables, Conversion from one flip-flop to another flip-flop, Design of ripple counters, Design of synchronous counters, Registers, Shift register, Bidirectional Shift register, Universal shift register.

UNIT- V

Synchronous Sequential Machines: Finite state machines, Mealy and Moore models, Analysis of Clocked Sequential circuits, Design procedures, State reduction and State assignment, Design and realization of circuits using various Flip-flops.

Learning Resources

Text Books:

1. Switching and Finite Automata theory, Zvi Kohavi and Niraj k Jha, Cambridge University Press, 3rd edition, 2010.

References:

1. Digital Design, Morris Mano, PHI, 3rd Edition, 2001.
2. Fundamentals of Logic Design, Charles H. Roth, Thomson Publications, 5th Edition, 2009.

Web Resources:

1. http://www.ece.ubc.ca/~saifz/eece256.htm
2. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/digital_circuit /frame/index.html

Electronics & Communication Engineering

EC3L1 **Basic Simulation Lab** **Credits: 2**

Lecture: --- Internal assessment: 25 marks
Lab : 3 periods/week Semester end examination: 50 marks

Course Objectives:

The objective of this laboratory is

- To introduce MATLAB and use it as a computation and visualization tool in the study of Signals & Systems and Probability theory & Stochastic process.
- An introduction to MATLAB is first given to provide the students with the foundation they need in this lab.
- Students will then be exposed to the applications of MATLAB to signal analysis and system design.

Learning Outcomes:

Student will be able to

- Analyze various types of signals and sequences.
- Apply convolution and correlation operations on different signals.
- Determine the response of an LTI system to given signals.
- Plot the spectrum of a given signal using MATLAB.
- Verify the Sampling theorem.
- Synthesize Laplace transform and able to locate poles and zeros of a system.
- Compute various statistical properties of a random noise and verify whether it is stationary.

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences such as Unit impulse, Unit step, Square, Triangular, Sinusoidal, Ramp and Sync functions.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting and Folding.
4. Finding Even and Odd Parts of a Signal or Sequence.
5. Verification of Linearity and Time Invariance properties of a given Continuous / Discrete-time system.
6. Convolution of Signals and Sequences.
7. Auto Correlation and Cross Correlation of Signals and Sequences.
8. Computation of Unit Sample and Unit Step Response of given LTI System.

9. Find the Fourier Transform of a given signal and plot its magnitude and phase spectrum.
10. Wave form synthesis using Laplace Transform.
11. Locating Poles and Zeros and obtain the pole-zero plot in S-plane for a given transfer function.
12. Generation of Gaussian Noise, Computation of its Mean, Mean Square values and its Skew, Kurtosis and PSD.
13. Verification of Sampling Theorem.
14. Removal of noise by autocorrelation/ cross correlation in a given signal corrupted by noise.
15. Checking a Random Process for Wide Sense Stationarity.

Electronics & Communication Engineering

EC3L2 **Network & Electrical Technology Lab** **Credits: 2**

Lecture: - Internal assessment: 25 marks
Lab: 3 period /week Semester end examination: 50 marks

Course Objectives:

- To understand and study various network parameters
- To implement various network theorems
- To understand different testing methods of A.C & D.C Machines

Learning Outcomes:

Student will be able to

- Apply the fundamental laws to the design and analysis of circuits.
- Analyze linear electrical circuits using the modified nodal analysis, mesh analysis and network theorems.
- Test A.C & D.C Machines using different techniques.

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments

1. Verification of Superposition and Reciprocity theorems.
2. Verification of maximum power transfer theorem.
3. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.
4. Two port network parameters – Z-Y Parameters
5. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
6. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
7. Load test on DC shunt generator. Determination of DC shunt generator characteristics.
8. Load test on DC compound generator. Determination of DC compound generator characteristics.
9. Brake test on DC shunt motor. Determination of performance characteristics.
10. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
11. Brake test on 3-phase Induction motor (performance characteristics).
12. Regulation of alternator by synchronous impedance method

Electronics & Communication Engineering

EC4T1 **Control Systems** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Signals & Systems (EC3T3), Network Analysis and Synthesis (EC3T4)

Course Objectives:

- To give a basic idea about analysis of linear control systems.
- To emphasize the student about stability analysis of a system.
- To learn how to improve the performance of an existing system
- Enable an engineer to explore time domain and frequency domain tools to design and study linear control systems.

Learning Outcomes:

Student will be able to

- Represent a system in different models
- Recognize and analyze feedback control mechanisms
- Analyse a linear control system using various time and frequency domain tools
- Analyse the stability of a system based on transfer function.

UNIT- I

Introduction to Control Systems: Classification of control systems-examples, Feedback Characteristics, Mathematical models – electrical, translational and rotational mechanical systems

Transfer Function Representation: Block diagram representation of systems-Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT- II

Time Domain Analysis: Standard test signals - Time response of first order systems – Characteristic equation of feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

Compensators and Controllers: lead, lag and lead-lag compensators, Effects of proportional derivative (PD), proportional integral (PI) systems, Proportional Integral and Derivative (PID) Controllers.

UNIT- III

Stability Analysis in S-Domain: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to open loop transfer function on the root loci.

UNIT- IV

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

Stability An alysis in Frequency Domain: Polar Plots, Nyquist Plots Stability Analysis.

UNIT- V

State Space Analysis : State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Learning Resources

Text Books:

1. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International (P) Limited, Pub. 2nd edition., 2005
2. Modern Control Engineering, Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 3rd ed., 1998.

References:

1. Automatic Control Systems 8th edition–B. C. Kuo– John wiley and son's., 2003
2. Modern Control Engineering, Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 3rd ed., 1998.
3. Control Systems Engg. , Nise– John wiley , 3rd Edition 2000

Electronics & Communication Engineering

EC4T2 **Pulse & Digital Circuits** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Electronic Devices & Circuits (EC 2T5)

Course Objectives:

- To introduce the fundamental concepts of the wave shaping
- To analyze different types of Multivibrators and their design procedures
- To familiarize the operation of Time-base Generators and logic families

Learning Outcomes:

Student will be able to

- Solve the problems on wave shaping circuits
- Design the Multivibrator circuits as per the specifications
- Classify and explain time base generators and logic families

UNIT- I

Linear Wave Shaping: Operation of High pass and Low pass RC circuits, Response of High pass and Low pass RC circuits to sinusoidal, step, pulse, square, exponential and ramp inputs, High pass RC circuit as a differentiator, Low pass RC circuit as an integrator.

UNIT- II

Nonlinear Wave Shaping: Clipping operation, Series & Shunt Diode clippers, Clipping at two independent levels, analysis of multi-diode clipping circuits, clamping operation, Positive and Negative clampers, biased clampers, steady state response of the clamping circuit to a square wave input, Clamping circuit theorem.

UNIT- III

Bistable Multivibrators: Design and Analysis of Fixed-bias& self-bias transistor binary, Commutating capacitors, Triggering of Binary, Non saturating Binary, Transistor Schmitt trigger and its applications.

UNIT- IV

Monostable &Astable Multivibrators: Collector coupled Monostable multivibrator-expression for the gate width, waveforms at bases and collectors; Collector coupled Astable multivibrator-expression for the frequency of operation, waveforms at bases and collectors, voltage to frequency convertor; design and analysis related problems on those circuits.

Logic families: DTL, TTL, ECL, MOS and CMOS logic families, Realization of NAND & NOR gates.

UNIT- V

Sweep Circuits: General features of a time-base signal, Exponential voltage sweep circuit, basic principles of Miller and Bootstrap time-base generators, transistor Miller voltage sweep generator, transistor bootstrap voltage sweep generator, simple current sweep circuit, linearity correction through adjustment of driving waveform, transistor current time base generator.

Learning Resources

Text Books:

1. Pulse Digital and Switching Waveforms, J. Millman and H. Taub, McGraw-Hill, 2nd Edition 1991.
2. Pulse and Digital Circuits, A. Anand Kumar, PHI, 2nd Edition, 2005.

References:

1. Digital Logic State Machine Design, David J. Comer Oxford University Press, 3rd Edition, 2008
2. Introduction to System Design Using Integrated Circuits, B S Sonde, New Age International, 2nd Edition, 1992.
3. David A Bell, "Solid State Pulse Circuits", Prentice Hall Inc, Fourth Edition, 2005.

Web Resources:

1. http://notes.smartzmail.com/wp-content/uploads/2013/10/PDC_Notes.pdf
2. http://jntufiles.com/2014/12/13/pulse-digital-circuits-textbook-free-download/
3. http://ftp.utcluj.ro/pub/users/dadarlat/circ_analognumeric-calc/curs8-eng.pdf
4. http://www.talkingelectronics.com/Download%20eBooks/Principles%20of%20electronics/CH-18.pdf

Electronics & Communication Engineering

EC4T3 **Analog Electronic Circuits** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Electronic Devices & Circuits (EC2T5), Network & Electrical Technology (EC3T4)

Course Objectives

- To introduce small signal and large signal behavior of transistors
- To analyze single and multistage amplifiers
- To familiarize the concepts of feedback amplifiers and oscillators

Learning Outcomes

Student will be able to

- Solve the problems on small signal and large signal amplifiers
- Design the amplifiers, feedback amplifiers and oscillators
- Characterize the given amplifier

UNIT- I

BJT at low frequencies: Transistor hybrid model, h-parameters, conversion formulas for the parameters of the three transistor configurations, analysis of a transistor amplifier circuit using h-parameters, emitter follower, comparison of transistor amplifier configurations, linear analysis of a transistor circuit, simplified CE hybrid model, simplified calculations for CC configuration, CE amplifier with an emitter resistance.

UNIT-II

BJT at high frequencies: hybrid-pi CE model, hybrid-pi conductances, hybrid-pi capacitances, validity of hybrid-pi model, variation of hybrid-pi parameters, CE short-circuit current gain, current gain with resistive load, voltage gain with resistive load, gain-bandwidth product, emitter follower at high frequencies.

UNIT- III

FET Amplifiers: FET small model, low frequency CS and CD amplifiers, CS amplifier at high frequencies, CD amplifier at high frequencies.

Multistage Amplifiers: cascading transistor amplifiers, cascode amplifier, Darlington emitter follower, bootstrapped Darlington circuit, frequency response of an amplifier, bandpass of cascaded stages, RC coupled amplifier- effect of coupling capacitor on low frequency response, effect of an emitter bypass capacitor on low frequency response; high frequency response of two cascaded CE transistor stages.

UNIT-IV

Feedback Amplifiers : Classification of amplifiers, Concept of feedback, transfer gain with feedback, General characteristics of negative feedback amplifiers, effect of feedback on input and output resistances, method of analysis of a feedback amplifier, voltage-series feedback, current-series feedback, current-shunt feedback, voltage-shunt feedback.

UNIT- V

Sinusoidal oscillators: principle of oscillations, **c**ondition for oscillations, RC-phase shift oscillator, Wien bridge oscillator, Hartley and Colpitts oscillators, Crystal oscillators, frequency stability.

Power Amplifiers: classification of amplifiers, class-A large signal amplifier, second-harmonic distortion, class-A transformer-coupled power amplifier, efficiency, push-pull amplifiers, class-B amplifiers, class-AB operation, class-C tuned power amplifier

Learning Resources

Text Books

1. Integrated Electronics – J. Millman and C.C. Halkias, McGraw-Hill, 1972.

References

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.
2. Micro Electronic Circuits – Sedra A.S. and K.C. Smith, Oxford University Press, 5th edition.
3. Electronic Circuit Analysis and Design – Donald A. Neaman, McGraw Hill.

Web Resources

1. http://aries.ucsd.edu/NAJMABADI/CLASS/ECE65/06-W/NOTES/

2. http://nptel.ac.in/courses/115102014/downloads/module3.pdf

3. https://coefs.uncc.edu/dlsharer/files/2012/04/I3.pdf

4. http://iweb.tntech.edu/snatarajan/ECE331/Classnotes/CHAP8_adobe.pdf

Electronics & Communication Engineering

EC4T4 Electromagnetic Fields and Waves Credits: 3

Lecture: 3 Periods/week Internal assessment: 30 marks
Tutorial: 1 Periods//week Semester end examination: 70 marks

Prerequisites: Engineering Mathematics – I (EC1T1), Engineering Physics (EC1T3)

Course Objectives

- To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.
- To lay the foundations of electromagnetism and its practice in modern communications such as wireless, guided wave principles such as fiber-optics and electronic electromagnetic structures.
- To develop an understanding of the fundamental concepts of electromagnetic fields, with an emphasis on wave propagation.

Course Outcomes

Student will be able to

- Apply the concepts of Vector calculus to solve the problems of Electromagnetic Fields in designing systems using the laws associated with Electrostatic and Magnetostatic Fields.
- Interpret the behavior of Electrostatic and Magnetostatic Fields in Materials and apply these concepts in designing systems.
- Analyze Maxwell's equations in different forms (differential and integral) and apply them in solving practical electromagnetic fields problems.
- Analyze and interpret the behavior of electromagnetic wave propagation in various media and apply these in the design of systems related to electromagnetic fields.

UNIT- I

Review of Orthogonal Co-ordinate Systems: Rectangular, Cylindrical, and Spherical Co-ordinate systems.

Vector Algebra: Scalars and Vectors, Vector Addition, Subtraction, Multiplication, Scalar triple product, Vector triple product.

Vector Calculus: Differential elements. Line, Surface, and Volume Integrals. Del Operator, Gradient, Divergence and Divergence theorem, Curl and Stokes theorem. Laplacian of scalar. Scalar fields, Vector fields, Conservative and Non-conservative fields.

UNIT- II

Electrostatic Fields: coulomb's Law of Force, Electric Field Intensity. Electric Field Intensity due to line, surface and volume charge distributions. Electric Flux density. Gauss's Law – First Maxwell equation. Applications of Gauss's Law. Electric Potential, Relationship between Electric Potential and Electric Field Intensity- Second Maxwell Equation. Electric Dipole and Flux Lines. Energy Density in Electrostatic Fields. Applications of Electrostatic Fields.

Electric Fields in Material Space: Properties of Materials. Convection and Conduction currents. Conductors. Dielectrics – Polarization, Dielectric constant and strength. Linear, Isotropic, Homogeneous Dielectrics. Continuity Equation and Relaxation time. Poisson's and Laplace's Equations. Resistance. Capacitance – Parallel-plate, Co-axial, and Spherical capacitors.

UNIT- III

Magnetostatic Fields: Biot-Savart's Law, Ampere's Circuit Law – Third Maxwell Equation, Applications of Ampere's law. Magnetic Flux Density- Fourth Maxwell Equation. Magnetic Scalar and Vector Potentials.

Magnetic Forces, Materials, and Devices: Forces due to Magnetic Fields, Magnetic Torque and Moment, Magnetic Dipole, Magnetization in materials, Classification of Magnetic materials. Inductors and Inductances- Concepts of self-inductance and mutual inductance. Magnetic Energy.

UNIT- IV

Maxwell's Equations: Faraday's Law, Transformer and Motional EMF, Inconsistency of Ampere's Law, Displacement current Maxwell's Equations- for static fields, Time- varying fields, and Time- Harmonic fields, and their word statements. Boundary Conditions for Electric and Magnetic for different interfaces

UNIT- V

Electromagnetic Waves: Wave Equation, Uniform Plane Waves: Relation between **E** and **H**, Uniform plane wave propagation in Lossless medium, conducting medium, good conductors, and good dielectrics - Expressions for Attenuation and phase constants, wavelength, wave velocity, intrinsic impedance. Skin Depth, Polarization – Linear, Elliptical, and Circular. Power and Pointing Vector, Reflection and Refraction of plane waves at Normal Incidence and Oblique Incidence.

Learning Resources

Text Books:

1. Principles of Electromagnetics – Matthew N.O. Sadiku, Oxford Univ. Press, 4th Ed., 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Ed, 2009.

References:

1. Engineering Electromagnetics – W H Hayt, J A Buck, Tata Mc Graw Hill, 7th Ed, 2006
2. Engineering Electromagnetics – Nathan Ida, Springer India 2nd Ed, 2008.
3. Electromagnetic waves – R K Shevgaonkar, Tata Mc-Graw Hill 1st Ed, 2005

Web Resources:

1. http://nptel.ac.in/syllabus/syllabus.php?subjectId=117103065
2. http://ocw.mit.edu/resources/res-6-001-electromagnetic-fields-and-energy-spring-2008/
3. http://nptel.ac.in/syllabus/syllabus.php?subjectId=117101057

Electronics & Communication Engineering

EC4T5 Analog Communications Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- To study various Amplitude modulation and demodulation systems.
- To study various Angle modulation and demodulation systems.
- To understand depth analysis in noise performance of various receivers.
- To analyze various pulse modulation and demodulation systems.

Learning Outcomes:

- At the end of the course, students are able to understand and analyze the
- The design of various AM modulation and demodulation techniques
- Design of angle modulation and demodulation techniques.
- Impact of noise on analog modulated signals.
- Performance of various transmitters and receivers
- Performance of Pulse modulation systems.

UNIT-I

Amplitude Modulation Systems - I: Block diagram of communication system, Need for modulation, Types of modulation, Amplitude Modulation: Time domain and frequency domain description of AM, single tone modulation, power relations in AM waves, Generation of AM waves: square law Modulator, Switching modulator. Demodulation of AM waves: Square law detector, Envelope detector. Frequency division multiplexing.

UNIT-II

Amplitude Modulation Systems - II: DSB Modulation: Double side band suppressed carrier modulation, time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulator, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, Quadrature carrier multiplexing. **SSB and VSB Modulation**: Time domain and Frequency domain description of SSB modulated waves, Generation of SSB waves, Demodulation of SSB waves. Time domain and frequency domain description of VSB modulated waves, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM techniques.

UNIT-III

Angle Modulation and Demodulation: Basic concepts of Phase and Frequency Modulation, Single tone frequency modulation, Narrow band FM, Wide band FM, Generation of FM

waves: Indirect FM, Direct FM. Balanced Frequency discriminator, Foster-Seeley Discriminator, Ratio detector, Zero crossing detector, Phase locked loop (First Order).

UNIT-IV

Receivers: AM and FM Radio broadcasting: AM Receivers and FM Receivers. AM Receiver model.

Noise in Analog Modulation Systems: Noise in DSB and SSB system, Signal to Noise Ratios for Coherent Reception, Noise in AM receivers using Envelope Detection, FM receiver model, Noise in FM reception, Threshold Effect, Pre-emphasis and De-emphasis in FM.

UNIT-V

Pulse Modulation: Time Division Multiplexing, Types of Pulse modulation, Generation & Demodulation of Pulse Amplitude Modulation, Pulse Width Modulation and Pulse Position Modulation, Comparison between TDM and FDM.

Learning Resources

Text Books

1. Introduction to Analog and Digital Communication System-Simon Haykin, John Wiley and Sons, 3rd Ed., 2009.

2. Fundamentals of Communication Systems - John G. Proakis, Masoud Salehi, PEARSON, 2nd Ed., 2013

References

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe,TMH, 3rd Ed.,2007
2. Analog and Digital Communication System-Sam Shanmugam, John Wiley and Sons,3rd Edition,2009

Electronics & Communication Engineering

EC4L1 Analog Communications Lab Credits: 2

Lecture: --- Internal assessment: 25 marks
Lab : 3 periods/week Semester end examination: 50 marks

Course Objectives:

- The purpose of this lab is to train the students to analyze the analog and pulse modulation and demodulation techniques and understand their performance using both hardware and MATLAB

Learning Outcomes:

At the end of the lab session, students are able to demonstrate

- Experiments band on AM and FM modulation/demodulation
- Study of various parameters in AM/FM receivers
- Generation and demodulation of PAM, PWM and PPM using MATLAB programming

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments

1. Amplitude Modulation and Demodulation
2. DSB SC Modulation and Demodulation
3. Frequency Modulation and Demodulation
4. Pre Emphasis and De Emphasis Circuits
5. PAM Generation and Reconstruction
6. PWM Generation and Reconstruction
7. PPM Generation and Reconstruction.
8. Spectral analysis of AM and FM signals using spectrum analyzer.
9. Phase locked loop.
10. Characteristics of Super heterodyne receiver
11. Amplitude modulation using MATLAB
12. DSBSC modulation using MATLAB
13. SSB modulation using MATLAB.
14. Frequency modulation using MATLAB.
15. Pulse width modulation using MATLAB.

Electronics & Communication Engineering

EC4L2 **Analog Electronic Circuits Lab** **Credits: 2**

Lecture: - Internal assessment: 25 marks
LAB: 3 period /week Semester end examination: 50 marks

Course Objectives

- To design and simulate amplifier & oscillator circuits
- To measure the parameters of an amplifier & an oscillator from a circuit based on discrete components

Learning Outcomes

Student will be able to

- Design, simulate and verify the amplifier & oscillator circuits as per the specifications

List of Experiments

Part-A: Design and Simulation using Multisim or Pspice or Equivalent Simulation Software (Any six)

1. Common Emitter and Common collector amplifier-Frequency response, Impedances measurement
2. Current shunt and Voltage shunt Feedback Amplifier-Frequency response, Impedances measurement (with and without feedback)
3. Common source and Common drain amplifier-Frequency response, Impedances measurement
4. Two Stage RC Coupled Amplifier
5. Cascode Amplifier
6. RC Phase Shift Oscillator using Transistors
7. Wien Bridge Oscillator using Transistors
8. Class A Power Amplifier
9. Class B Complementary Symmetry Amplifier

Part-B: Hardware (Any six)

1. Common Emitter and Common collector amplifier-Frequency response, Impedances measurement
2. Current shunt and Voltage shunt Feedback Amplifier- Frequency response, Impedances measurement (with and without feedback)
3. Common source and Common drain amplifier-Frequency response, Impedances measurement
4. Two Stage RC Coupled Amplifier
5. Cascode Amplifier
6. RC Phase Shift Oscillator using Transistors
7. Wien Bridge Oscillator using Transistors

Electronics & Communication Engineering

EC4L3 **Pulse & Digital Circuits Lab** **Credits: 2**

Lecture: - Internal assessment: 25 marks
Lab: 3 period /week Semester end examination: 50 marks

Course Objectives

- To observe the output waveforms of linear wave shaping circuits for different inputs and different circuit time constants.
- To obtain the responses of clipping and clamping circuits for a given input.
- To design Multivibrator circuits and verify their operation.
- To verify the operation of voltage regulators.

Course Learning Outcomes

Student will be able to

- Analyze the working of linear and nonlinear wave shaping circuits.
- Design multivibrators and voltage regulators as per the specifications.

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments
(Both Hardware & Software using Multisim)

1. High pass & Low pass RC circuits
2. Clippers & Clampers
3. Bistable Multivibrator
4. Monostable Multivibrator
5. Astable Multivibrator
6. Schmitt Trigger
7. Logic gates with discrete components (Diodes, Transistors)
8. UJT Relaxation Oscillator
9. Bootstrap sweep circuit
10. Sampling Gates
11. Series Voltage Regulator
12. Shunt Voltage Regulator

Electronics & Communication Engineering

EC5T1 **Linear Integrated Circuits** **Credits: 3**

Lecture: 3 periods/week Internal Assessment: 30 Marks
Tutorial: 1 period /week Semester Semester End Examination: 70 Marks

Prerequisites: Analog Electronic circuits (EC4T3)

Course Objectives:

- To understand the internal diagram and characteristics of Op-amp.
- To learn about the linear and non-linear applications of Op-amp.
- To understand the industrial applications using 555 timer and PLL.
- To study about the various types of data converters.

Learning Outcomes:

Student will be able to

- Build internal design concept of Op-amp related to its characteristics
- Identify various linear and non-linear applications using Op-amp
- Develop different order active filters and data converters
- Validate and verify various applications of 555 timer and PLL.

UNIT-I

Differential Amplifier: DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

Characteristics of Op-Amps: Introduction to OP-amp, Op-amp Block Diagram, ideal and practical Op-amp specifications, interpretation of DC and AC characteristic curves, 741 op-amp & its features, interpreting datasheets, Op-Amp parameters & Measurement, Input & Out put off set voltages & currents, slew rates, CMRR, PSRR.

UNIT-II

Linear Applications of Op-Amps: Inverting and Non-inverting amplifier, Integrator and differentiator, Summing and Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers.

Non-Linear Applications of Op-Amps: Comparators, Multivibrators, Triangular and Square wave generators, sine wave generation: principle, Wien-bridge, phase-shift, quadrature oscillators, Log and Anti log amplifiers, Precision rectifiers, clampers.

UNIT-III

Active Filters: Introduction, classification, Butter worth filters – 1st order, 2nd order LPF, HPF, Band pass, Band reject and All pass filters qualitative and quantitative analysis, Bode plot. Switched capacitor filters: working principle, advantages and disadvantages

UNIT-IV

Timers: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger. Voltage controlled oscillator -566, applications.

Phase Locked Loops: PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators.

UNIT-V

D/ A & A/ D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC Specifications, IC AD 574 (12 bit ADC).

Learning Resources

Text books:

2. Op-Amps and Linear Integrated Circuits, - Ramakanth A. Gayakwad, PHI, 4th Edition, 2009
3. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.

References:

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd Edition, 2002.

2. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition, 2005.

Electronics & Communication Engineering

EC5T2 **Transmission Lines and Waveguides** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Electromagnetic Fields and Waves (EC4T4)

Course Objectives

- To understand the basic transmission modes of EM waves
- To learn the usage of smith chart to solve various transmission line problems
- To study the characteristics of EM wave propagation in rectangular, circular and cavity resonators

Course Outcomes

Student will be able to

- Understand the propagation characteristics of EM waves in transmission lines and waveguides.
- Analyze and design various transmission line components and circuits.
- Compute various transmission line parameters using Smith chart

UNIT – I

Basics of Transmission Lines: Concept and definition, Different kinds of transmission lines, Applications, Equivalent circuit, Primary constants- R, L, C and G, Secondary constants – Propagation constant and Characteristic Impedance, General transmission line equations. Attenuation and phase constant. Wavelength, phase velocity and group velocity. Time domain transmission line equations. The lossless transmission line, the infinite long transmission line, the distortion less transmission line and condition for distortionlessness and minimum attenuation, the low resistance transmission line. Loading, Types of loading, Losses.

UNIT-II

Finite Transmission Lines: The load reflection coefficient, Standing Wave Ratio, Line impedance, generalized reflection coefficient, the lossless terminated transmission line, the lossless matched transmission line, the lossless shorted transmission line, the lossless open transmission line, the lossless resistively loaded transmission line. Power relations on a general transmission line.

UNIT-III

UHF Lines: UHF lines as circuit elements: λ/4, λ/2, λ/8 lines, **Smith Chart:** Construction of smith chart, Smith chart as impedance chart, smith chart as admittance chart, Problems using smith chart. Impedance matching- Single stub with applications, Quarter wave transformer.

UNIT-IV

Guided waves: Review of Maxwell's equations for time varying and time-harmonic fields, Wave equations and boundary conditions.

Rectangular Waveguides: Transverse Electric (TE) and Transverse Magnetic (TM) mode analysis – Field expressions, Characteristic equation, Cut-off frequency, Phase velocity, Group velocity, Attenuation and Phase constants, Wavelength and Impedance. Filter characteristics, Dominant and degenerate modes, Mode dispersion, Power transmission and Power loss expressions.

UNIT-V

Circular Waveguides: Transverse Electric (TE) and Transverse Magnetic (TM) mode analysis – Field Expressions, Characteristic equation, Cut-off frequency, Phase velocity, Group velocity, Phase constant, Wavelength and Impedance.

Cavity Resonators: Rectangular and Cylindrical cavities, Dominant modes and Resonant Frequencies, Q factor, Types of coupling and Coupling coefficients.

Introduction to strip lines and microstrip lines

Learning Resources

Text Books

1. Engineering Electromagnetics, Nathan Ida, Springer International, 2nd Edition 2008.

2. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2009

References

1. Microwave Devices and Circuits – Samuel Y. Liao, Pearson Education, 3rd Edition, 2003.

2. Foundations for Microwave Engineering – R.E. Collins, Wiley student Edition, 2nd Edition, 2007.

3. Microwave Engineering- David M Pozar, Wiley student Edition, 3rd Edition, 2007.

4. Annapurna Das, Sisir K Das, "Microwave Engineering", 2nd edition, 2006, Tata McGraw Hill.

Web Resources

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/em/index.htm

2. http://nptel.iitm.ac.in/video.php?subjectId=117101056

3. http://www.cdeep.iitb.ac.in/nptel/Electrical%20&%20Comm%20Engg/Transmission%20Lines%20and%20EM%20Waves/TOC.htm

4. http://www.mike-willis.com/Tutorial/PF2.htm

Electronics & Communication Engineering

EC5T3 Computer Architecture & Organization Credits: 3

Lecture: 3 periods/week Internal Assessment: 30 Marks
Tutorial: 1 period /week Semester Semester End Examination: 70 Marks

Prerequisites: Switching Theory and Logic Design.(EC3T6)

Course Objectives:

1. To introduce basic principles of computer organization and architecture.
2. To provide examples of different processors and instruction sets.
3. To give a basis for understanding issues of computer operation and performance.
4. To familiarize the students with computer arithmetic.

Learning Outcomes:

Students will be able to

1. Conceptualize the impact of instruction set architecture on cost-performance of computer design.
2. Design a pipeline for consistent execution of instructions with minimum hazards.
3. Articulate different ways to incorporate long latency operations in pipeline design.
4. Understand the impact of branch scheduling techniques and their impact on processor performance.
5. Restate alternatives in cache design and their impacts on cost/performance.

UNIT-I

Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift unit

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction cycle. Memory Reference Instructions. Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

UNIT-II

Microprogrammed Control: Control Memory, Address Sequencing, Microprogram Example, Design of control unit.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation Program control, Reduced Instruction Set Computer (RISC), Overlapped Register Windows

UNIT-III

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory

UNIT-IV

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT-V

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors

Learning Resources

Text Books:

1. Computer System Architecture, M. Moris Mano, 3rd Edition, Pearson/ PHI, 2007
2. Computer Systems Organization and Architecture, John D Carpinelli,Pearson/PHI,2001

References:

1. Computer Organization, Car Hamacher, Zvonks Vranesic, Safwat Zaky, 5th Edition, McGrawHill. 2002
2. Computer Architecture and Organization, John P. Hayes., 3rd Mc Graw Hill International editions, 1998.
3. Computer Architecture: A quantitative approach, John L. Hennessy, David A. Patterson, 4th Mc Graw Hill International editions, 2006.
4. Structured Computer Organization, Andrew S. Tanenbaum,4th edition, Prentice Hall , 1998

Web resources

1. http://nptel.iitm.ac.in/courses/Webcoursecontents/IITKANPUR/Comprchitecture/page1.htm
2. http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT20Guwahati/comp_org_arc/web/index.htm

Electronics & Communication Engineering

EC5T4 **Antennas and Wave Propagation** **Credits: 3**

Lecture: 3 Hrs. /week Internal assessment: 30 marks

Tutorial: 1 Hrs. /week Semester end examination: 70 marks

Prerequisites: Electromagnetic Field Theory (EC 4T4)

Course Objectives

- To introduce the fundamental principles of antenna theory and to apply them to the analysis, design.
- To introduce to the design principles of types of antenna arrays.
- To understand the radiation mechanism of various types of antennas and also to learn about the basic parameters of antennas and their measurement.
- To understand the wave propagation over ground and through different layers of atmosphere

Learning Outcomes

Student will be able

- Estimate the fundamental properties of antennas in order to construct a wireless communication link.
- Analyze the radiation characteristics of various antenna array configurations.
- Design and develop antennas required in various wireless communication systems for different frequency bands.
- Interpret the problems associated with radio wave propagation in the atmosphere

UNIT- I

Antenna Fundamentals: Introduction, radiation mechanism – single wire, 2 wire, dipoles, current distribution on a thin wire antenna, antenna parameters - radiation patterns, patterns in principal planes, main lobe and side lobes, beam widths, beam area, radiation intensity, beam efficiency, directivity, gain and resolution, antenna apertures, aperture efficiency, effective height, Friss transmission equation.

Linear Wire Antennas: Retarded potentials, radiation from small electric dipole, quarter wave monopole and half wave dipole – current distribution, evaluation of field components, power radiated, radiation resistance, beam widths, directivity, effective area and effective height, antenna theorems.

UNIT-II

Antenna Arrays: Introduction, 2-element arrays – different cases, principle of pattern multiplication, N-element uniform linear arrays – broadside, end fire arrays, EFA with increased directivity, concept of scanning arrays, directivity relations, Binomial arrays.

UNIT-III

HF, VHF and UHF Antennas: Introduction, resonant and non-resonant antennas, long wire antennas, V- antennas, rhombic antenna, design considerations. Loop antennas: field components, comparison of far fields of small loop and short dipole.

Broadband Antennas: Introduction, folded dipole, Yagi-Uda antenna, helical antenna-monofilar, axial mode and normal mode operations, biconical antenna.

UNIT-IV

Microwave Antennas: Introduction, reflector antennas- plane reflector, corner reflector, parabolic reflector- types, feed systems, F/D ratio, aperture blocking. Horn antennas – types, optimum horns, design characteristics of pyramidal horns; Lens antennas – geometry, features, dielectric lenses and zoning, applications. Antenna measurements – patterns required, set up, distance criterion, directivity and gain measurements.

UNIT-V

Wave Propagation: Ground wave propagation–characteristics, parameters, wave tilt, flat and spherical earth considerations. Sky wave propagation – structural details of ionosphere, refraction and reflection, ray path, critical frequency, MUF, LUF, OF, skip distance, virtual height, Ionospheric abnormalities, Ionospheric absorption. Space wave propagation – mechanism, LOS and radio horizon. Tropospheric wave propagation – radius of curvature of path, effective earth's radius, field strength calculations, M-curves and duct propagation, tropospheric scattering.

Learning Resources

Text Books:

1. Antenna Theory: Analysis and Design – Constantine A. Balanis, John Wiley & Sons, 3rd Ed., 2009
2. Transmission and propagation-E. V. D. Glazier and H.R.L. Lamont, vol.5 Standard Publishers Distributors- New Delhi

References:

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Ed., 2009.
2. Antennas and Wave Propagation – John D Kraus and Ronald J Marhefka, Ahmad S khan, TMH, 4th Ed., 2010.
3. Antennas and Wave Propagation - G. S. N. Raju, Pearson, 2014

Web Resources:

1. http://www.antenna-theory.com/

2. http://www.antenna-theory.com/basics/main.html

Electronics & Communication Engineering

EC5T5 **Digital IC Applications** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period/week Semester end examination: 70 marks

Prerequisites: Switching Theory and Logic Design (EC 3T6)

Course Objectives

- To study the detailed features of hardware description language with emphasis on Verilog Hardware Description Language (Verilog HDL).
- To study the various digital logic IC families with emphasis on CMOS and TTL logic and their interfacing.
- To develop the Verilog HDL code for various digital ICs of combinational & sequential logic circuits those are mostly used.
- To study the architecture specifications and applications of various types of ROMs and RAMs.

Learning Outcomes

Student will be able to

- Design various combinational & sequential logic circuits using Digital ICs.
- Verify and validate architecture, functional specifications & various applications of standard digital IC's of 74 XX series & CMOS IC's of 40 XX series.

UNIT-I

Verilog Hardware Description Language: Design flow, program structure, Verilog Data types and Operations, Binary data manipulation, Combinational and Sequential logic design, Structural Models of Combinational Logic, Dataflow modelling, continuous assignments, Delays, Behavioural modelling.

UNIT-II

Logic Families : Introduction to logic families, CMOS logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Comparison of logic families, Familiarity with standard 74XX series-ICs and 40 XX series-ICs – Specifications.

UNIT-III

Combinational Logic Design: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits comparators, adders & subtractors, ALUs, Combinational multipliers. Verilog models for the above ICs.

UNIT-IV

Sequential Logic Design: Latches and flip-flops, counters, shift register, and their Verilog models, synchronous design methodology, impediments to synchronous design.

UNIT-V

ROMs: ROM Internal structure, 2D-decoding, commercial types and applications, EPROM and EEPROM Internal structure and applications.

Learning Resources

Text Books

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed. 2005.

2. Verilog Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition, 2003.

References

1. Introduction to Logic Design – Alan B. Marcovitz, TMH, 2nd Edition, 2005.
2. Fundamentals of Digital Logic with Verilog Design – Stephen Borwn and Zvonko Vramesic,TMH.2nd Ed. 2005

Electronics & Communication Engineering

EC5T6 **Digital Signal Processing** **Credits: 3**

Lecture: 3periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Signals and Systems (EC3T3)

Course Objectives:

- To introduce the concepts and techniques associated with discrete time signals and systems.
- To develop the representation of discrete-time signals in the frequency domain using Discrete Fourier transform (DFT).
- To learn the basic forms of FIR and IIR filters, and how to design filters with desired frequency responses.
- To Study the concepts of Multirate DSP and its applications.

Learning Outcomes:

Student will be able to

- Analyze properties of discrete time Signals and Systems.
- Design FFT algorithms.
- Realize various digital filters for DSP applications.
- Implement the applications of DSP in speech processing and spectrum analysis.

UNIT-I

Discrete Time Signals and Systems: Introduction to Digital signal processing, Discrete time Signals, Discrete time systems, Analysis of Linear Time-Invariant Systems, Convolution, Causality and Stability.

The Z- Transform: Definition, Properties of Z-Transform, Inverse z Transform, Computation of Frequency Response, Solution of linear constant coefficient difference equations using Z Transforms

UNIT-II

The Discrete Fourier Transform (DFT): Introduction to DFT, Properties of the DFT, Circular Convolution, overlap add method, overlap save method, Relationship of DFT to other Transforms. Radix-2 Decimation-In-Time (DIT) and Decimation-In-Frequency (DIF) FFT Algorithms, Inverse FFT

UNIT-III

Design of IIR Digital Filter: Design procedure for Analog Butterworth and Chebyshev filters, Design of IIR Digital Filters using Bilinear Transformation, Analog Design using

Digital Filters, Design of Digital Filters using Digital to Digital Transformation, Impulse Invariant Design.

UNIT-IV

Design of FIR Digital Filters: Introduction to FIR Filters, Design of Linear phase FIR Digital Filters using Windows (Rectangular, Bartlett, Blackman, Hamming and Hanning windows) and Frequency Sampling Method.

Realization of Discrete time systems: Realization of IIR and FIR systems-Direct, Cascade, Parallel, Ladder realizations.

UNIT-V

Multirate Digital Signal Processing: Introduction, Decimation and Interpolation by integer factor, Sampling rate conversion by Rational number, Multistage approach to sampling rate Conversion, Applications of Multirate Signal processing.

Learning Resources

Text Books

1. Digital Signal Processing: Principles, Algorithms and Applications, John G Proakis & D. G. Manolakis, PEARSON, 4th Edition, 2007.
2. Fundamentals of Digital Signal Processing - Lonnie C Ludeman, John Wiley & Sons, 2003

References

1. Introduction to Digital Signal Processing "Johnny R Johnson, PHI Learning, 2011
2. Theory and Application of Digital Signal Processing - Lawrence R Rabiner & Bernard Gold, Prentice Hall.

Web References

1. www.nptel.iitm.ac.in
2. http://www.ece.cmu.edu/~ee791/
3. http://www.ee.umanitoba.ca/~moussavi/dsp815/LectureNotes/index.html
4. http://cobweb.ecn.purdue.edu/~ipollak/ee438/FALL04/notes/notes.html

Electronics & Communication Engineering

EC5L1 **Linear IC Applications Lab** **Credits: 2**

Lecture: -- Internal Assessment: 25 Marks
Tutorial/Lab: 3 period /week Semester Semester End Examination: 50 Marks

Course Objectives

- To understand the design concept of linear and non-linear applications of Op-amp.
- To understand the designing industrial applications using 555 timer.
- To study about the various types of data converters.

Learning Outcomes

Students will be able to

- Build design concept of Op-amp related applications.
- Develop different order active filters and data converter
- Validate and verify various applications of 555 timer.

NOTE: Minimum of 10 experiments has to be designed theoretically and tested using NI MultiSim software & hardware and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments

1. OP -AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Op-amp inverting and non-inverting amplifiers for desired gain and bandwidth.
3. Practical active integrator and differentiator using IC741.
4. IC 741 Wien Bridge Oscillators for the desired frequency.
5. Schmitt Trigger Circuit using IC 741.
6. Function Generator using OP AMPs.
7. Phase-shift oscillator using IC 741.
8. Active Filter Applications –Design LPF, HPF (first order and second order) for desired value of gain and bandwidth.
9. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters (first order) for desired value of gain and bandwidth..
10. IC 555 Timer – Monostable Operation Circuit.
11. IC 555 Timer – Astable Operation Circuit.
12. 4 bit DAC using OP AMP.

Electronics & Communication Engineering

EC5L2 **Digital IC Applications Lab** **Credits: 2**

Lecture: --- Internal assessment: 25 marks
Lab: 3 periods/week Semester end examination: 50 marks

Course Objectives:

- To simulate the functions of the following digital ICs using Verilog HDL and verify their operation practically:

IC 74x74 (D-flip flop)
IC 74x90 (Decade counter)
IC 74x95 (Shift register)
IC 74x138 (3 to 8 decoder)
IC 74x49 (BCD to 7-segment)
IC 74x83 (4-Bit Binary Adder)
IC 74x93 (4 Bit counter)
IC 74x85 (4 bit comparator)
IC 74x151 (8 to 1 multiplexer)
IC 74x155 (2 to 4 demultiplexer)
IC 74x189 (RAM)
IC 74x181 (ALU Design)
IC 74x194 (Universal shift registers)

Learning Outcomes

- Student will be able to design, simulate & test the logic circuits for various applications using digital ICs like Flip-flops, counters, shift registers, decoders, comparators, multiplexers, de-multiplexers & memories.

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments

1. Realization of Logic Gates
2. 3 to 8 Decoder -74x138
3. 8 x 1 Multiplexer-74x151 and 2x 4 De-multiplexer-74x155
4. BCD to 7-segment Decoder 74x49
5. 4- Bit comparator-74x85
6. 4-Bit Binary Adder 74x83
7. D Flip-Flop-74x74
8. Decade counter -74x90
9. 4 Bit counter-74x93
10. Shift registers-74x95
11. Universal shift registers-74x194/ 195
12. RAM (16 x 4)-74x189 (Read and Write operations)
13. 4-Bit ALU Design – 74x181

Electronics & Communication Engineering

EC 6T1 **VLSI Design** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period/week Semester end examination: 70 marks

Prerequisite: Electronic Devices and Circuits (EC2T5)

Course Objectives

- Understand VLSI Design Flow
- Learn Transistor-Level CMOS Logic Design
- Understand VLSI Fabrication
- Learn to analyze Functionality and Timing Characteristics of Logic Gates

Learning Outcomes

Student will be able to

- Gain knowledge of different VLSI fabrication processes and CMOS Logic Design.
- Design different MOS logical circuits.
- Analyze the effects of Scaling.
- Program PLDs, CPLDs and FPGAs.

UNIT- I

Basic Electrical Properties of MOS Circuits and Fabrication: Introduction to IC Technology, The IC Era, MOS and related VLSI Technology, Basic MOS Transistors. Enhancement and Depletion modes of transistor action, MOS and CMOS Fabrication process, BiCMOS Technology, Comparison between CMOS and Bipolar technologies. Id versus Vds Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans-conductance and Output Conductance, MOS transistor Figure of Merit, The Pass transistor. The nMOS Inverter, The CMOS Inverter, Latch-up.

UNIT-II

Layout diagrams: Layout Design rules, Layout Diagrams of CMOS inverter and different logic functions.

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiling Capacitances, Fan-in and fan-out characteristics, Realization of gates using nMOS, pMOS and CMOS technologies.

UNIT-III

Scaling of MOS Circuits: Scaling model s and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise, Limits due to current density, Introduction to Switch Logic and Gate Logic.

UNIT-IV

Programmable Logic Devices (PLDs): Programmable Logic Arrays (PLA), Programmable Array Logic (PAL). Implementation approaches in VLS1 Design- full Custom Design, Semicustom Design, Gate Arrays, and Standard Cells, FPGAs

UNIT-V

Test Principles : Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques, System-level Test Techniques.

Learning Resources

Text Books

1. Essentials of VLSI Circuits and Systems- Kamran Eshraghian, Douglas and A Pucknell, PHI. Private Limited, 2005.

2 Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 1999.

References

1. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning, 2005.
2. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
3. Digital Integrated Circuits - John M. Rabaey, PHI, EEE, 1997.
4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
5. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.
6. Fundamentals of Logic Design with VHDL– Stephen. Brown and ZvonkoVranesic, TMH, 2005

Electronics & Communication Engineering

EC6T2 **Microprocessors & Microcontrollers** **Credits: 3**

Lecture: 3 periods/week Internal Assessment: 30 Marks
Tutorial: 1 period /week Semester End Examination: 70 Marks

Prerequisites: C programming (EC1T5), Computer Architecture and Organization (EC5T3)

Course objectives:

- To develop an in-depth understanding of the operation of microprocessors and microcontrollers, and write assembly language programs.
- To understand various interfacing techniques for microprocessor.
- To understand design and implementation of microprocessor-based systems in both hardware and software.

Learning Outcomes:

Student will be able to

- Interface 8086 microprocessor with the external memory chips
- Develop programs using different class of instructions for 8086 microprocessor and 8051 microcontroller.
- Design and develop real time application modules using ARM microcontroller.

UNIT-I

Introduction to Microprocessors: Introduction and evolution of microprocessors, Architecture of 8085 processor, pin configuration of 8085, bus organization, and basic instruction sets.

UNIT-II

Instruction sets and programming of 8086: Architecture and features of 8086, pin configuration of 8086, minimum mode and maximum mode, timing diagrams, addressing modes. Data transfer instructions, arithmetic instructions, logical instructions, flag manipulation instructions, control transfer instructions, shift / rotate, string instructions & related programs

UNIT-III

Peripheral Interfacing: keyboard / display controller 8279, programming 8255 with 8086, modes of operation of 8254, interfacing programmable interrupt controller 8259, programmable communication interface 8251 & DMA controller 8257.

UNIT- IV

Microcontroller: Introduction to 8051 microcontroller, architecture, memory organization, special function registers, on chip resources, Addressing modes of 8051 and basic instruction set of 8051 and programming.

UNIT-V

ARM Architecture: introduction to 16/32 bit processors, ARM Architecture, ARM Instruction sets, thumb instruction set, thumb instruction format.

Development tools for ARM: Introduction to micro controller development tools, Serial peripheral interface $I^{2}C$ Bus, ADC, UART – Stepper Motor Control - DC Motor Control.

Learning Resources

Text Books:

1. Microprocessors & Interfacing, Douglas.V. Hall, 3 rd Edition, Pearson/ PHI. 2007
2. Microcontrollers, Architecture, programming, interfacing and system design, Rajkamal, Pearson, 4th edition.2010

References:

1. Microprocessors & Controllers, N.Senthil Kumar, Oxford University press 2010.
2. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, 2 rd Edition, PHI.
3. Advanced microprocessor and Peripherals - A.K.Ray and K.M.Bhurchandi, Tata Mc Hill, 2000. 4. Micro Controllers – Deshmukh, Tata McGraw Hill Edition.6th reprint, 2007.

Web Resources:

1. http://freevideolectures.com/Course/3018/Microprocessors-and-Microcontrollers
2. http://www.cdeep.iitb.ac.in/NPTEL2/
3. www.nptel.ac.in/

Electronics & Communication Engineering

EC6T3 **Microwave Engineering** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Antennas and Wave Propagation (EC5T4)

Course Objectives:

- To identify various microwave bands in frequency spectrum and to know their applications in different fields
- To understand the limitations of conventional tubes to operate in microwave region and to learn constructional details of various microwave tubes and solid state devices.
- To analyze single port and multiport passive waveguide components using their scattering parameters
- To learn the procedures to measure various important parameters in microwave engineering

Learning Outcomes

Student will be able to

- Know various frequency bands of microwave range and their designations in electromagnetic spectrum and applications of microwaves.
- Design the microwave bench setup with different wave guide components.
- Use various microwave tubes and microwave solid state devices for high frequency applications to overcome the disadvantages of conventional tubes
- Measure the characteristic values of microwave components by conducting several tests on microwave bench setup

UNIT – I

Microwave Spectrum, Bands and applications, Limitations of conventional tubes at microwave frequencies

Microwave Tubes: Linear Beam Tubes (O-type): Two Cavity Klystron: Velocity modulation, Bunching process, Output power and Beam loading, Multicavity Klystron Amplifier: Beam current density, Output current, Reflex Klystron: Velocity modulation, Power output and Efficiency.

Microwave Crossed Field Tubes (M Type): Cylindrical Magnetron (Qualitative analysis only), Forward Wave Cross Field Amplifier, Backward Wave Oscillator and Backward Wave Amplifiers.

Helix Traveling Wave Tube Amplifiers, Amplification process, Wave modes and Gain considerations.

UNIT – II

Microwave Passive Components – I: Waveguide Sections: Matched terminations, Short circuit plungers, Waveguide bends, Corners and Twists, Probe and Loops, Attenuators and Phase Shifters of different types, Waveguide multiport junctions – E plane and H plane Tees, Magic Tee and its applications, Hybrid Ring.

S – Matrix calculation for Attenuator, Phase shifter, multiport junctions

UNIT – III

Microwave Passive Components – II: Ferrite Devices: Faraday rotation, Gyrator, Isolator, Circulator, Directional couplers, Coupler parameters, Applications of directional couplers.

S – Matrix calculation for Gyrator, Isolator, circulator, Directional coupler.

Microwave Resonators: Waveguide cavity resonators, Cavity excitation and Tuning, Q-Factor calculation.

UNIT – IV

Solid State Devices: Microwave Tunnel Diode: Principle of operation and characteristics

Transferred Electron Devices: Gunn diodes, RWH Theory, Modes of operation, LSA diodes, InP diodes Avalanche Transit Time Devices: Read diode, IMPATT diode, TRAPATT diode, BARITT diode. Parametric Amplifier: Non-linear reactance and Manley-Rowe power relations.

UNIT – V

Microwave Measurements: Description of microwave bench – Different blocks and their features, Precautions. Power measurement, Attenuation measurement, Impedance measurement, VSWR measurement, Frequency measurement, Measurements of cavity Q factor.

Learning Resources

Text books:

1. Foundations for Microwave Engineering – R.E. Collin, John Wiley, 2nd Edition, 2005
2. Samuel Y Liao, "Microwave Devices and Circuits", 3rd edition, 2003, Pearson Education.

References:

1. Annapurna Das, Sisir K Das, "Microwave Engineering", 2nd edition, 2006, Tata McGraw Hill.
2. Microwave Engineering- David M.Pozar, John Wiley & Sonsm, Inc., 2nd Edition, 2004
3. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
4. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999

Web Resources:

1. http://technology.niagarac.on.ca/courses/elnc1730/microsolid.ppt
2. http://www.intechopen.com/---/passive_microwave_components_ana_antenna
3. http://home.sandiego.edu/~ekim/e194rfs01/
4. http://www.slideshare.net/sarahkrystelle/lecture-notes-microwaves

Electronics & Communication Engineering

EC6T4 **Digital Communications** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites:

Signals and Systems, Analog Communications

Course Objectives:

- To study sampling, quantization and coding that are fundamental to digital transmission of analog signals.
- To understand baseband and band pass, spread spectrum signal transmission and reception techniques.
- To understand source coding techniques meant for data compression
- To understand error control coding techniques meant for error detection and correction.

Learning Outcomes:

Students are able to

- Design PCM and DM Systems.
- Analyse various methods of digital modulation and demodulation techniques.
- Analyse different Source Coding techniques and their efficiency.
- Generate Coding sequences for different error correcting codes

UNIT-I

Waveform Coding Techniques: Introduction, Pulse code modulation (PCM), Delta modulation, Adaptive delta modulation, Differential Pulse Code Modulation (DPCM), output Signal to quantization Noise ratio in PCM and DM systems.

Baseband Pulse Transmission: Inter symbol interference, Nyquist's Criterion for Distortion less Baseband Binary Transmission, Correlative coding.

UNIT-II

Signal Space Analysis: Introduction, Gram Schmidt Orthogonalization procedure, Geometric interpretation of signals, Coherent detection of signals in noise, Probability of error, Correlation receiver, Matched filter, Properties.

Digital Modulation Techniques: Coherent Phase Shift Keying, Coherent Frequency Shift Keying, Quadrature Phase Shift Keying, Non Coherent Frequency Shift Keying, Differential Phase Shift keying.

UNIT- III

Spread-Spectrum Modulation: Introduction, Pseudo-Noise Sequences, Direct sequence spread spectrum, Processing Gain, Probability of Error, Antijam Characteristics, Frequency-Hop Spread spectrum, Slow frequency Hopping, Fast Frequency Hopping

UNIT-IV

Information Theory: Introduction, information, Entropy, Source Coding Theorem, Data Compaction, ,Shannon-Fano coding, Huffman coding, Lempel-Ziv Coding, Discrete memoryless channels, Mutual information, channel coding Theorem, Differential Entropy , Information Capacity Theorem and its implications.

UNIT-V

Error Control Coding: Introduction, Linear Block codes, Syndrome and its Properties, Syndrome Decoding, Cyclic Codes, Encoder, Syndrome calculator, Convolutional Codes, Code Tree, Trellis and State Diagram.

Learning Resources

Text Books:

1. Digital communications, Simon Haykin, John Wiley, 4th Edition 2010

2. Digital Communications – John Proakis, TMH, 3rd Edition, 1995

References:

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 1979.

2. Communication systems –A B Carlson, McGraw-Hill, 4th Edition,2002

3. Principles of Communication Systems – H.Taub , D. Schilling , TMH, 3rd Edition,2008

4. Digital communications - B Sklar, Pearson Education, 2nd Edition, 2013

Web References:

1. http://www.ece.utah.edu/~npatwari/ece5520/lectureAll.pdf
2. http://nptel.iitm.ac.in/syllabus/syllabus.php?subjectId=117105077

Electronics & Communication Engineering

EC6T5 **Computer Networks** **Credits: 3**

Lecture: 3 periods/week Internal Assessment: 30 Marks
Tutorial: 1 period /week Semester Semester End Examination: 70 Marks

Prerequisites: ---

Course Objectives:

- To build an understanding of the fundamental concepts of computer networking.
- To introduce various network models in vogue and to study the network topologies.
- To study the principles of operation of various layers of OSI model in detail.
- To study the TCP/IP and OSI model protocols in detail and their IEEE standards

Learning Outcomes:

Student will be able to

- Master the concepts of networking protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
- Classify various computer network topologies, the working of various layers in OSI model and TCP/IP and their IEEE standards
- Build the skills of sub netting and routing mechanisms.

UNIT-I

Introduction: Uses of Computer Networks, OSI, TCP/IP, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer: Transmission media copper, twisted pair wireless, switching techniques; ISDN and ATM.

UNIT-II

Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Data link layer in HDLC

Medium Access sub layer: ALOHA, Carrier sense multiple access. IEEE 802.X Standard Ethernet, wireless LANS. Bridges

UNIT-III

Network Layer-Design and Routing: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing

Network Layer-Congestion control and IP: Rotary for mobility. Congestion control Algorithms. The Network layer in the internet

UNIT-IV

Transport Layer: Transport Services, Connection management, TCP and UDP protocols

UNIT-V

Application Layer: Domain name system, Electronic Mail; the World WEB, Basics of Multi Media.

Learning Resources

Text Books:

1. Computer Networks—Andrew S Tanenbaum, Pearson Education/PHI, 4th Ed., 2003.
2. Data Communications and Networking–Behrouz A. Forouzan. TMH, 3rd Ed., 2002.

References:

1. An Engineering Approach to Computer Networks-S. Keshav, Pearson Education, 2nd Ed., 2005.
2. Understanding communications and Networks, W.A. Shay, Thomson, 3rd Ed., 2006.

Web Resources:

1. http://home.iitk.ac.in/~navi/sidbinetworkcourse/lecture1.ppt
2. http://nptel.iitm.ac.in/courses/IIT-MADRAS/Computer_Networks/index.php

Electronics & Communication Engineering

EC6T6FE1 Introduction to MATLAB Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- To learn basics of MATLAB programming
- To learn the basic skills in MATLAB to develop Algorithms for various applications
- To learn the skills in MATLAB to design, simulate and analyze behaviour of Engineering systems
- To learn MATLAB programming for designing real time engineering systems

Course Outcomes:

Students will be able to

- Write programs for basic applications in Engineering
- Model Engineering systems
- Design and Simulate Engineering systems
- Develop code for various real time applications in Engineering and Technology

UNIT- I

Introduction: Starting MATLAB, Working in command window, Arithmetic operations, Display formats, Elementary Math Built-in functions, Defining scalar variables, useful commands for managing variables, Script files, Examples of MATLAB applications

UNIT- II

Creating arrays and Mathematical operations with arrays: Creating 1-dimensional and 2-dimensional arrays, The Transpose operator, Array addressing, using a colon: in addressing arrays, Adding elements to existing variables, Deleting elements, Built in functions for handling arrays, Strings and strings as variables, Addition and Subtraction, Array Multiplication and Division, Element-by-Element operations, using arrays in MATLAB built-in math functions, Built in functions for analysing arrays, Generation of Random Numbers, Examples of MATLAB applications

UNIT- III

Two Dimensional and Three Dimensional Plots:plot, fplot commands, Formatting a plot, plots with logarithmic axes, error bars, special graphics, Histograms, Polar plots, putting multiple plots on the same page, Multiple figure windows, Examples, Line plots, Mesh and surface plots, plots with special graphics, The view command, Examples of MATLAB applications

UNIT- IV

Programming in MATLAB: Relational and Logical operators, conditional statements, The switch-case statement, Loops, Nested Loops and Nested conditional statements, The break and continue commands, creating a function file, structure of a function file, Local and Global variables, saving a function file, using a User-defined function, Examples of simple User-defined functions, comparison between script files and function files, Anonymous and Inline functions, Function functions, sub functions, and Nested functions

UNIT- V

Polynomial, Curve-fitting, Interpolation, Numerical Analysis and Symbolic Math: Polynomials, curve fitting, Interpolation, The Basic fitting interface, Examples, solving equation of one variable, Finding minimum or maximum of a function, Numerical integration, ordinary differential equations, Symbolic objects and symbolic expressions, changing the form of an existing symbolic expression, solving algebraic equations, Differentiation, Integration, plotting symbolic expressions, Numerical calculations with symbolic expressions

Learning Resources

Text Books:

1. MATLAB: An Introduction with applications – Amos Gilat, Wiley India Pvt. Ltd, 4th Ed., 2012.

References:

1. Getting started with MATLAB – Rudra Pratap, Oxford University Press, 2010
2. MATLAB and SIMULINK for Engineers – Agam Kumar Tyagi, Oxford University Press, 2012.

Electronics & Communication Engineering

EC6T6FE2 Artificial Neural Networks Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Control Systems (EC4T1)

Course Objectives:

- Biological motivation to design intelligent systems and control.
- Analysis of learning systems in conjunction with feedback control systems
- Evaluate the performance of the intelligent control systems using computer simulations.
- Exposure to the world control problems.

Learning Outcomes:

Student will be able to

- Analyze the working of biological neural network & the artificial neural networks.
- Apply the principles of artificial neural network in the fields of image processing, pattern recognition & solving optimization problems.
- Design the real time systems using Artificial Neural Networks.

UNIT- I

Introduction to Artificial Neural Networks: Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison between Brain and the Computer, Comparison between Artificial and Biological Neural Networks.

UNIT- II

Fundamental Models of Artificial Neural Networks: Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or LeastmeanSqure (LMS) rule.

UNIT- III

Feed Forward Networks : Introduction, Single Layer Perceptron Architecture, Algorithm, Multilayer Perceptron networks, Back Propagation Network (BPN), Back Propagation rule, Architecture, Training Algorithm, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

UNIT- IV

Adaline and Madaline Networks: Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.

UNIT- V

Counter Propagation Networks : Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Forward Only counter Propagation Network, Architecture, Training Algorithm.

Learning Resources

Text Books:

1. Artificial Neural Networks - B. Yegnanarayana, PHI, 2006
2. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition,1992

References:

1. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, and
2. Sanjay Ranka, Penram International, 2001
3. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Edition.,2008
4. Fundamental of Neural Networks – LaureneFausett, Pearson, 1st Edition.,1994

Electronics & Communication Engineering

EC 6T6FE3 Digital Image Processing Credits: 3

Lecture: 3periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- To acquire the fundamentals of image processing and mathematical transforms necessary for image processing.
- To know the details of image enhancement in spatial and frequency domains
- To study the image compression, and restoration techniques
- To attain knowledge of image segmentation techniques

Learning Outcomes:

Student will be able to

- Analyze different types of images and color models
- Improve the quality of images using Spatial and frequency domain filtering.
- Apply the restoration techniques to improve the fidelity of images.
- Design the techniques for image compression, image Segmentation for various applications.

UNIT I

Digital Image fundamentals: Digital Image Representation, Fundamental steps in image processing, Concept of gray levels, Gray level to binary image conversion, Sampling and quantization, Resolution, types of images, Relationship between pixels.

UNIT II

Image Enhancement in Spatial Domain: processing, Histogram processing, Image smoothing & Image sharpening.

Image Enhancement in frequency Domain: Steps involved in frequency domain filtering, Image smoothing & Image sharpening.

UNIT III

Image compression: Redundancies and their removal methods, Fidelity criteria, Image compression models, lossy and lossless compression.

UNIT IV

Image segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding, region – oriented segmentation.

UNIT V

Colour image processing: Colour fundamentals, Colour models, Pseudo colour image processing, full colour image processing

Learning Resources

Text Books:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2nd Edition, 2002.

References:

1. Fundamentals of Digital Image processing – A.K.Jain, PHI. 1989
2. Digital Image processing- S Jayaraman, S Esakkirajan and T. Veerakumar.TMH 3rd Edition, 2010.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. The Essential Guide to Image Processing-Alan c. Bovik, Academic Press, 2009.

Web Resources:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/Digi_Img_Pro/ui/TOC.htm

2. http://nptel.iitm.ac.in/video.php?subjectId=117105079

3. http://en.wikipedia.org/wiki/Digital_image_processing.

4. http://www.filestube.com/d/digital+image+processing+gonzalez+solution.

Electronics & Communication Engineering

EC6T6FE4 **Microcontrollers** **Credits: 3**

Lecture: 3 periods/week Internal Assessment: 30 Marks
Tutorial: 1 period /week Semester End Examination: 70 Marks

Prerequisites: Microprocessors & Microcontrollers (EC6T2)

Course objectives:

- To introduce the concepts and techniques associated with the understanding of microcontrollers and advanced micro controllers in the development of various applications
- To know complete architectural, programming, interfacing details.

Learning outcomes:

Student will be able to

- Program a microcontroller to perform various tasks
- Interface a microcontroller to various devices and peripherals
- Design and implement a microcontroller-based embedded system

UNIT I

Introduction to Microcontrollers: 8, 16, 32 bit microcontrollers, embedded and external memory microcontrollers, CISC and RISC architecture microcontrollers, Harvard and Princeton memory architecture microcontrollers, examples of popular microcontroller s.

UNIT II

Microcontroller onchip resources: Basic processing unit, internal buses and interrupt handling, program and data memory, parallel ports, onchip registers, special function registers, UART, timers/ counters, PWM, watchdog timers, onchip A/D converters, power down mode, Real time clock, reset circuit, oscillator circuit, interrupts in 8051.

UNIT III

Peripherals and interfacing: serial UART, USART, I2C & SPI communication interfacing, parallel IO ports interface, sources of interrupts and programming. ADC, DAC circuit interfacing.

UNIT IV

32-bit ARM7, ARM 9 microcontrollers: Architecture of ARM 7, ARM 9 & ARM-Cortex

UNIT V

ARM Instructions & Development tools: ARM instruction set, thumb instruction set, exception handling in ARM, development tools.

Learning Resources

Text Books:

1. Microcontrollers Architecture, programming, interfacing and system design- Raj Kamal, Second Edition, Pearson.
2. Microprocessors & Microcontrollers – N.Senthil Kumar, M.Saravanan, S.Jeevananthan. Oxford university press.

References:

1. Introduction to Embedded System- Shibu KV, Mc-Graw Hill Higher Edition.
2. Embedded/ Real Time Systems-KVKK Prasad, Dreamtech Press, 2005.

Web resources

1. http://www.ti.com/lsds/ti/microcontrollers_16-bit_32-bit/msp/overview.page
2. http://community.arm.com/docs/DOC-7261
3. http://nptel.ac.in/courses/Webcourse-contents/IIT KANPUR/microcontrollers/micro/ui/TOC.htm

Electronics & Communication Engineering

EC6L1 **Digital Communications Lab** **Credits: 2**

Lecture: --- Internal assessment: 25 marks
Lab: 3 periods/week Semester end examination: 50 marks

Course Objectives:

- The purpose of this lab is to train the students to analyse various base band and pass band modulation and demodulation techniques and understand their performance using both hardware and MATLAB.

Learning Outcomes:

Student will be able to

- Generation and demodulation of PCM and DM waves
- Generation and demodulation of PSK, FSK and DPSK waves.
- Study of different error control coding techniques.

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments

1. Time division multiplexing & demultiplexing.
2. Pulse code modulation & Demodulation
3. Differential pulse code modulation & Demodulation.
4. Delta modulation & Demodulation.
5. Phase shift keying modulation & Demodulation.
6. Differential phase shift keying modulation & Demodulation.
7. Frequency shift keying modulation & Demodulation.
8. Phase shift keying modulation using MATLAB
9. Frequency shift keying modulation using MATLAB
10. Direct sequence spread spectrum using MATLAB
11. Implementation of Shannon Fano coding using MATLAB.
12. Implementation of Huffman coding algorithm using MATLAB.
13. Implementation of cyclic code encoder using MATLAB.
14. Implementation of Convolutional Encoder using MATLAB

Electronics & Communication Engineering

EC6L2 **Microprocessors & Microcontrollers Lab** **Credits: 2**

Lecture: --- Internal assessment: 25 marks
Lab: 3 periods/week Semester end examination: 50 marks

Prerequisites: C programming (EC1T5), Computer Architecture and Organization (EC5T3)

Course Objectives:

- Familiarize the architecture of 8086 processor, assembling language programming and Interfacing with various modules.
- The student can also understand 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers.

Learning Outcomes:

Student will be able to:

- Apply knowledge of the microprocessor's internal registers and operations by use of a PC based microprocessor simulator.
- Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
- Develop assembly language programs and download the machine code that will provide solutions such as fluid level control, temperature control, and batch processes.

NOTE: Minimum of 10 experiments has to be performed and recorded by the candidate to attain eligibility for External Practical Examination.

List of Experiments

1. Introduction to Debugger / XT86 / TASM: 8-bit Arithmetic Operations
2. 16-bit Signed and unsigned Arithmetic operations, ASCII – arithmetic operations.
3. Arithmetic operations – Multi byte Addition and Subtraction, Sum of Squares, Sum of Cubes
4. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
5. 8255 – PPI: Write ALP to generate sinusoidal wave using PPI.
6. Using string operation and Instruction prefix: Move Block, Reverse string, String comparison

7. Write ALP to find smallest, largest number, arrange numbers in Ascending order, Descending order in a given series.
8. Traffic Lights Interface.
9. Stepper Motor Interface
10. 8279 – Keyboard Display: Write a small program to display a string of characters.
11. ADC Interface / DAC Interface.
12. Arithmetic Operations using 8051.
13. Reading and Writing on a parallel port.
14. Timer in Different Modes
15. Serial Communication using 8051.

Electronics & Communication Engineering

EC6L3 **OOPS LAB** **Credits: 2**

Lecture: --- Internal assessment: 25 marks
Lab: 3 periods/week Semester end examination: 50 marks

Course Objectives:

- To make the student learn a object oriented way of solving problems.
- To teach the student to write programs in Java to solve the problems

Learning Outcomes:

Student will be able to

- Use basic I/O to communicate with the user to populate variables and control program flow.
- Use arithmetic, logical, relational, and string manipulation expressions to process data.
- Write a complete class definition with in the class definition, write class and instance methods including the constructor and overloaded methods.
- Implement appropriate program design using good programming style. Conceptualize, Analyze and write programs to solve more complicated problems using the concepts of Object Oriented and java technology.
- Apply validation techniques to build a reliable solution to a given problem. Apply all the programming concepts as and when required in the future application development.

Recommended Systems/Software Requirements:

Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space and JDK Kit.

Exercise 1: a) Write a java program to display simple text message.

b) Write a Program to Perform Arithmetic operations (+,-,*,/,%) reading the value through key board.

Exercise 2: a) Write a Program to display colors using switch case (VIBGYOR).

b) Write a Program to check whether the given number is even or odd using switch.

Exercise 3: (using while and do-while)

a) Write a program to calculate sum of individual digits of a given number.

b) Write a program to print given number in reverse order and check the

number is palindrome or not

c) Write a program to check whether given number is Armstrong or not.

Exercise 4: a) Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, c and use the quadratic formula. If the discriminant b2 -4ac is negative, display a message stating that there are no real solutions.

b) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program to print the nth value in the Fibonacci sequence .

Exercise 5: a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.

b) Write a Java program to multiply two given matrices and find it's transpose (Exercise Find identity Matrix of a given size)

Exercise 6: a) Write a Java program that checks whether a given string is a palindrome or not. Ex MALAYALAM is a palindrome.

b) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)

Exercise 7: a)Write a java Program that Demonstrates the Concept of Inheritance

Exercise 8: a) Write a java program to create an abstract class named Shape that contains an empty method named number Of Sides ( ).Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method number Of Sides ( ) that shows the number of sides in the given geometrical figures.

(b) Write a Java program that demonstrates Packages

Exercise 9: a) Write a Java program demonstrating the life cycle of a thread.

Exercise 10: a) Develop an applet that displays a simple message.

. b) Write a Java program that allows user to draw lines, rectangles and ovals.

Exercise 11: a) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

b) Write a Java program for handling mouse events.

Exercise 12: a) Write a program that creates a user interface to perform integer divisions.

The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Exercise 13: Write a java program that lets user create pie charts. Design your own user interface (with swings and AWT)

Learning Resources

References:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
2. Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education
3. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Pvt. Ltd.

Electronics & Communication Engineering

EC6L4 Personality Development & Soft Skills Credits: --

Lecture: 2 periods/week Internal assessment: --
Tutorial/Lab: -- Semester end examination: --

Course Objective: To enhance holistic development of students and improve their employability skills to make them Industry ready.

Learning Outcomes:
Student will be able to:

- To develop inter & intra personal skills and be an effective goal oriented team player.
- To develop communication and problem solving skills.
- To Develop Group and team thinking skills.
- To develop as professionals with idealistic, practical and moral values.
- To re-engineer attitude and understand its influence on behavior.
- To mould as Future Industry Leaders by improving Personal and Professional effectiveness.

UNIT I

Self-Analysis: Inter & Intrapersonal skills, Situation description of Interpersonal Skill. SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem. Attitude, Factors influencing Attitude, Challenges and lessons from Attitude. Change Management Exploring Challenges, Risking Comfort Zone, Managing Change. Behavioral Styles, Being Assertive. Responsibility Vs accountability, Sense of Ownership.

UNIT II:

Motivation: Factors of motivation, Intrinsic & Extrinsic Motivators. Self-motivation techniques. Goal setting: Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. Time Management: Value of time, Diagnosing Time Management, Weekly Planner to do list, Prioritizing work. Creativity: Out of box thinking, Lateral Thinking, Saying No, Dealing with the Ramble, Responding to Criticism. Emotional Intelligence: What is Emotional Intelligence, emotional quotient? Why Emotional Intelligence matters, Emotion Scales.Case studies and discussions.

UNIT III

Team Work: Stages of team formation, Necessity of Team Work Personally, Socially and Educationally. Leadership Vs Management**:** Types of leadership styles, Skills to be a good manager and good Leader, Assessment of Leadership Skills, Understanding the relationship between Leadership Networking & Team work, Realizing Ones Skills in Leadership, Networking & Team Work, Stress Management: Causes of Stress and its impact, how to manage & distress, Understanding the circle of control, Stress Busters. Decision Making: Importance and necessity of Decision Making, process of Decision Making, Practical way of Decision Making, Weighing Positives & Negatives. Case studies, Situation reaction tests.

UNIT IV

Professional Communication: An Overview of Professional Communication, Essential Professional Communication Skills Tools of communication, levels of communication, Verbal Communication: Oral & written communication (Listening, Speaking, Reading & writing). Nonverbal Communication: Body language. Activities to improvise Listening, Reading, Speaking & writing. Public Speaking: elements, Do's & Don'ts. Group discussions: Types, Skills assessed, Types of discussion topics, SPELT approach, Keyword approach, VAP. E-mail etiquette, Telephone etiquette, work etiquette. Grooming.

UNIT V

Resume Building: 5Principles of Resume Building, Resume Vs Curriculum Vitae, Different Formats of Resume, Do's & Don'ts of Resume, how to face Interviews, Standard Interview questions, SRT, Mock Interviews.

Learning Resources

Text Books:

1. The ACE of softskills by Gopalaswamy Ramesh & Mahadevan Ramesh –Pearson

References:

1. Working with Emotional Intelligence - David Goleman.
2. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd.,Delhi

Electronics & Communication Engineering

EC 7T1 **Optical Communications** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Digital Communications (EC5T3)

Course Objectives:

- To introduce the students to various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- To study about various optical sources and optical detectors and their use in the optical communication system.
- To learn about optical transmitter circuits & receiver circuits and digital optical system.
- To familiar with measurements of Attenuation, Dispersion, Refractive Index.

Learning Outcomes:

Students are able to

- Design an optical fiber communication link.
- Analyze the characteristics of LED, LASER source and Photo detectors
- Measure dispersion and attenuation in OFC.

UNIT- I

Optical Fiber Waveguides: Historical Development, General System, Advantages of Optical Fibers, Applications of Optical Fiber Communication.

Ray Theory Transmission, Cylindrical Fibers, Single Mode Fibers.

UNIT- II

Transmission Characteristics of Optical Fibers: Introduction, Attenuation, Material Absorption Losses in Silicon Glass Fibers, Linear Scattering Losses, Non Linear Scattering Losses, Fiber Bend Loss. Intramodel Dispersion, Intermodal Dispersion, Dispersion in Single Mode Fibers. Fiber Optic Components: Fiber Alignment & Joint Loss, Fiber Splices, Fiber Connectors.

UNIT- III

Optical Sources: - LED: Introduction, LED Power & Efficiency, LED Structures, LED Characteristics, LASER Basic Concepts, Optical Emission from Semiconductors, Semi-Conductor Injection Laser, Laser Structures, Single Frequency Injection Lasers.

UNIT- VI

Detectors: Introduction, Optical Detection Principles, Absorption, Quantum Efficiency, Responsitivity, Semi- Conductor Photo Diode with Internal Gain, Semi-Conductor Photo Diode without Internal Gain.

UNIT- V

Optical Fiber Systems, Measurements & Networks: Optical Transmitter Circuits, Optical Receiver Circuits, Digital Systems, Digital System Planning Considerations. Attenuation Measurement, Dispersion Measurement, Refractive Index, Optical Time Domain Reflectometer (OTDR), Basic networks, SONET/SDIT, Broadcast and select WDM Networks.

Learning Resources

Text Books:

1. Optical fiber Communication, Gerd Keiser, Mc Graw Hill. 3rd Edition , 2003
2. Optical Fiber Communications: Principles and Practice, John M Senior, PHI, 2nd Edition, 2002

References:

1. Fiber Optic Communication Technology, Djafar K Mynbaev and Lowell L. Scheiner, Pearson Education, 2006
2. Fiber Optics Communication, Kolimbiris, McGraw Hill. , 1st Edition, 2003
3. Fiber Optic Communication Technology, Djafar K Mynbaev and Lowell L. Scheiner, Pearson Education, 2006

Electronics & Communication Engineering

EC 7T2 **Digital Image Processing** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Pre Requisites: Digital Signal Processing (EC5T6)

Course Objectives:

- To acquire the fundamentals of image processing and mathematical transforms necessary for image processing.
- To know the details of image enhancement in spatial and frequency domains
- To study the image compression, and restoration techniques
- To attain knowledge of image segmentation techniques

Learning Outcomes:

Student will be able to

- Analyze different types of images, colour models and various transforms.
- Improve the quality of images using Spatial and frequency domain filtering.
- Apply the restoration techniques to improve the fidelity of images.
- Design the techniques for image compression, image Segmentation for various applications.

UNIT I

Digital Image fundamentals: Digital Image Representation, Fundamental steps in image processing, Concept of gray levels. Gray level to binary image conversion, Sampling and quantization, Resolution, Relationship between pixels.

Image Transforms: 2-D discrete fourier transform and its Properties, Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform.

UNIT II

Image Enhancement in Spatial Domain: Point processing, Histogram processing, Image smoothing & Image sharpening.

Image Enhancement in frequency Domain: Steps involved in frequency domain filtering, Image smoothing & Image sharpening.

UNIT III

Image compression: Redundancies and their removal methods, Fedility criteria, Image compression models, lossy and lossless compression.

UNIT IV

Image segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding, region – oriented segmentation.

UNIT V

Colour image processing: Colour fundamentals, Colour models, Pseudo colour image processing, full colour image processing

Morphological processing: Erosion, Dilation, Opening, closing operations, Hit or Miss transform, Boundary detection, Region filling, Thinning and Thickening.

Learning Resources

Text Books:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 3rd Edition, 2002.

References:

1. Fundamentals of Digital Image processing – A.K.Jain, PHI. 1989
2. Digital Image processing- S Jayaraman, S Esakkirajan and T. Veerakumar.TMH, 3rd Edition, 2010.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. The Essential Guide to Image Processing-Alan c. Bovik, Academic Press, 2009.

Web Resources:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT- KANPUR/ Digi_Img_Pro /ui/TOC.htm
2. http://nptel.iitm.ac.in/video.php?subjectId=117105079
3. http://en.wikipedia.org/wiki/Digital_image_processing.
4. http://www.filestube.com/d/digital+image+processing+gonzalez+solution.

Electronics & Communication Engineering

EC7T3 Cellular and Mobile Communications Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Antennas and Wave Propagation (EC5T4)

Course Objectives:

- To enable the student to synthesis and analyze wireless and mobile cellular communication systems over a stochastic fading channel
- To provide the student with an understanding of advanced multiple access techniques
- To provide the student with an understanding of diversity reception techniques
- To give the student an understanding of digital cellular systems (GSM, CDMA)

Learning Outcomes:

Student will be able to

- Develop a cellular system using frequency reuse concept with minimum interferences
- Implement best frequency management and channel allocation schemes to improve the trunking efficiency
- Design the cellular base station for the desired specifications
- Deploy GSM system for mobile communications

UNIT- I

Cellular mobile radio systems: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, planning of cellular system. **Elements of cellular radio system design:** General description of the problem, concept of frequency reuse channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system.

UNIT- II

Cell coverage for signal and traffic: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, general formula for mobile propagation over water and flat open area, antenna height gain, form of a point to point model.

Small-Scale Fading and Multipath: Small-Scale Multipath Propagation, Types of Small-Scale Fading, Statistical Models for Multipath Fading Channels, Diversity techniques.

UNIT – III

Interference: Co-Channel Interference, Measurement of co-channel interference, Non-co-channel interference – Different types.

Cell site and Mobile antennas: Sum and difference patterns and their synthesis, Omni directional antennas, Directional antennas for interference reduction, Space diversity

antennas, Umbrella pattern antennas, Minimum separation of cell site antennas, High gain antennas.

UNIT -IV

Frequency management and Channel assignment: Numbering and grouping, Setup, access and paging channels, Channel assignments to cell sites and mobile units, Channel sharing and borrowing, Sectorization, overlaid cells

Handoff and Dropped Calls: Handoff, Dropped calls, Types of handoff, Handoff invitation, Delaying handoff, Forced handoff, Mobile assigned handoff. Intersystem handoff, Cell splitting, Micro cells,

UNIT -V

Global System For Mobile (GSM): GSM Services and features, GSM System architecture, GSM radio subsystem, GSM Channel types, GSM Traffic channels, GSM Control channels, Examples of GSM call, Frame structure for GSM, Signal processing in GSM.

Learning Resources

Text Books

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edition 1995.

References

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.
2. Wireless Digital Communications - Kamilo Feher, PHI, 2003.
3. Wireless Communications, Theodore. S. Rapport, Pearson education, 2rd Edition, 2002.

Web Resources

1. http://nptel.iitm.ac.in/syllabus/117103016/
2. http://nptel.iitm.ac.in/video.php?courseId=1036
3. http://rechargesvec.blogspot.in/2011/09/cellular-and-mobile-communications-cmc.html

Electronics & Communication Engineering

EC7T4A **Embedded & Real Time Systems** **Credits: 3**

Lecture: 3 periods/week Internal Assessment: 30 Marks
Tutorial: 1 period /week Semester End Examination: 70 Marks

Prerequisites: Microprocessors & Microcontrollers (EC6T2)

Course objectives:

- To design and develop the process for embedded (dedicated) computer systems in relation to the environment in which they operate.
- To integrate embedded hardware, software, and operating systems to meet the functional requirements of embedded applications.

Learning outcomes:

Student will be able to

- Apply design methodologies for embedded systems
- Implement embedded systems design with specifications and technological choice.
- Build fundamental systems such as sensors, actuators, converters, processors, intra- and inter-communication networks and interfaces,
- Use modern hardware/software tools for building prototypes of embedded systems

UNIT I

Introduction: History of Embedded Systems, Major Application Areas of Embedded Systems, Purpose of Embedded Systems, Core of the Embedded System, Sensors and Actuators, Communication Interface, Embedded Firmware.

UNIT II

Hardware Software Co-Design And Programme Modeling: Characteristics of an Embedded System, Quality Attributes of Embedded Systems, Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Hardware Software Trade-offs.

UNIT III

Devices in Embedded Systems: Types of supporting devices for an embedded system – various forms of ROM, RAM devices, interrupt sources and their controlling in various families of processors, serial port devices, parallel port devices, timers and counting devices.

UNIT IV

Communication Buses for Device Networks: Interfacing Features in Device Ports, Wireless Devices, Networked Embedded Systems, Serial Bus Communication Protocols, Parallel Bus Device Protocols- Parallel Communication Network Using ISA, PCI, PCI-X and

Advanced Buses, Internet Enabled Systems- Network Protocols, Wireless and Mobile System Protocols.

UNIT V

Design of Real Time Systems: processors in complex embedded systems, design process in embedded system, optimizing design metrics, Case study for adaptive cruise control system in car, Case study of coding for sending application layer byte streams on a TCP/IP networks.

Learning Resources

Text Books:

1. Embedded Systems Architecture, Programming and Design- Raj Kamal, Second Edition, McGrawHill Companies.
2. Introduction to Embedded System- Shibu KV, Mc-Graw Hill Higher Edition.

References:

1. Embedded System Design – A Unified Hardware/Software Introduction-Frank Vahid, Tony D. Givargis, John Wiley, 2002.
2. Embedded/ Real Time Systems-KVKK Prasad, Dreamtech Press, 2005.

Web Resources:

1. http://users.ece.utexas.edu/~bevans/courses/ee382c/resources/
2. http://www.windriver.com/vxworks/reinvented/?gclid=CJ7ApdaD2MQCFYUmjgodcVUApA
3. http://www.eventhelix.com/realtimemantra/issuesinrealtimesystemdesign.htm#.VR1s5_yUdqU
4. ftp://ftp.bupt.edu.cn/pub/Documents/so-many-notsorted/linux%20for%20embedded%20and%20realtime%20app.pdf

Electronics & Communication Engineering

EC7T4B **Digital System Design** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1period/week Semester end examination: 70 marks

Prerequisites: Switching Theory and Logic Design (EC3T6)

Course Objectives:

- To analyze and design combinational and sequential logic circuits.
- To understand developing Verilog HDL code to describe and synthesize combinational & sequential logic circuits.

Learning Outcomes:

Student will be able to

- Design latches, flip-flops, and differentiate between synchronous and asynchronous circuit operation.
- Perform analysis of synchronous sequential circuits.
- Develop Verilog HDL implementations on the structured design of synchronous sequential circuits.
- Design algorithmic state machines (ASMs) for digital system design.

UNIT-I

Digital Logic Design Using Verilog HDL: Introduction to CAD Tools, Introduction to Verilog, Structural Specification of Logic Circuits, Behavioral Specification of Logic Circuits, Synthesis of Logic Functions Using Multiplexers, Multiplexer Synthesis Using Shannon's Expansion, Decoders , Demultiplexers Binary Encoders Priority Encoders , Code Converters , Verilog for Combinational Circuits ,The Conditional Operator, The If-Else Statement ,The Case Statement , The For Loop .Edge-Triggered D Flip-Flops , D Flip-Flops with Clear and Preset ,T Flip-Flop ,JK Flip-Flop.

UNIT-II

Arithmetic Circuits: Half Adder, Full Adder, Ripple- Carry Adder, Carry Look – Ahead Adder, Serial Adder , multiplication, Arithmetic Comparison Circuits and Design of Arithmetic Circuits Using Verilog .

UNIT-III

Synchronous Sequential Circuits: State Table , State Assignment ,Choice of Flip-Flops and Derivation of Next-State and Output Expressions ,State-Assignment Problem ,One-Hot Encoding ,Mealy State Model, Verilog Code for Moore-Type FSMs, Verilog Code for Mealy FSMs, Specifying the State Assignment in Verilog Code .State Minimization ,Design of a Counter Using the Sequential Circuit Approach State Diagram and State Table for a Modulo-

8 Counter ,State Assignment , Implementation Using D-Type Flip-Flops Implementation Using JK-Type Flip-Flops ,Algorithmic State Machine (ASM) Charts.

UNIT-IV

Asynchronous Sequential Circuits: Asynchronous Behavior, Analysis of Asynchronous Circuits, Synthesis of Asynchronous Circuits, State Reduction.

UNIT-V

SRAM and Timing Parameters: Static Hazards , Dynamic Hazards , Significance of Hazards, Flip-Flops and Registers with Enable Inputs ,Shift Registers with Enable Inputs, Static Random Access Memory(SRAM) ,SRAM Blocks in PLDs, Clock Skew ,Flip-Flop Timing Parameters, Asynchronous Inputs to Flip-Flops.

Learning Resources

Text Books

1. Stephen Brown & Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog design", Tata McGraw Hill,2002

References

1. Samir Palnitkar, "Verilog HDL", Pearson Education, 2nd Edition,2003.
2. J. Bhaskar, "A Verilog Primer'', BSP, 2nd edition 2003.

Electronics & Communication Engineering

EC7T4C **Artificial Neural Networks & Fuzzy Logic** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Control Systems (EC4T1)

Course Objectives:

- Biological motivation to design intelligent systems and control.
- Analysis of learning systems in conjunction with feedback control systems
- Evaluate the performance of the intelligent control systems using computer simulations.
- Exposure to the world control problems.

Learning Outcomes:
Student will be able to

- Analyze the working of biological neural network & the artificial neural networks.
- Apply the principles of artificial neural network in the fields of image processing, pattern recognition & solving optimization problems.
- Design the real time systems using fuzzy logic.
- Develop the algorithms for real time systems using ANN &FL

UNIT- I

Introduction to Artificial Neural Networks: Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison between Brain and the Computer, Comparison between Artificial and Biological Neural Networks.

UNIT- II

Fundamental Models of Artificial Neural Networks: Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule.

UNIT- III

Adaline and Madaline Networks: Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.

UNIT- IV

Classical & Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT- V

Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.
Applications: Neural network applications: Process identification, control, fault diagnosis and load forecasting. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

Learning Resources

Text Books:

1. Artificial Neural Networks - B. Yegnanarayana, PHI, 2006.
2. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - Yadaiah and S.

   Bapi Raju, Pearson Education

References:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications- Rajasekharan and Rai – PHI Publication.
2. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, and Sanjay Ranka, Penram International, 2001
3. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Edition.,2008
4. Fundamental of Neural Networks – LaureneFausett, Pearson, 1st Edition.,1994
5. Neural Networks and Fuzzy Logic System by Bork Kosk, PHI Publications
6. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition,1992

Electronics & Communication Engineering

EC7T4D **Bio Medical Instrumentation** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks

Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- With widespread use and requirements of medical instruments, this course gives knowledge of Electro-physiology, Bio-electrical and non-electrical parameters measurement related to various systems of human body.
- It attempts to render a broad and modern account of biomedical instruments.

Learning Outcomes:

Student will be able to

- Understand the Origin of Bioelectric potential and their measurements using appropriate electrodes and Transducers.
- Understand the Electro-physiology of various systems and recording of the bioelectric signals
- Understand the working principles of various Imaging techniques
- Understand the design aspects of various Assist and Therapeutic Devices

UNIT- I

Bioelectric Potentials, Electrodes and Transducers: Sources of Bioelectric potentials - Resting and action potential - Propagation of Action potential, Bioelectric Signals, Electrode theory- Equivalent circuit- Types of electrodes. Biochemical Transducers- pH, pCo2 and pO2 electrodes.

UNIT- II

Electrophysiological Measurements: Electrophysiology of Heart, Nervous system and Muscle activity. ECG - EEG, Evoked potential - EMG- ERG- Electrodes, lead systems and typical waveforms.

UNIT- III

Non-Electrical Parameter Measurements: Measurement of blood pressure, blood flow, Plethysmography, Cardiac Output, Heart Sounds- Lung volumes and their measurements- Auto analyzer - Blood cell counters, Oxygen saturation of Blood.

UNIT- IV

Medical Imaging Techniques: X-Ray Machine - Computer Tomography - Angiography - Ultrasonography - Magnetic Resonance Imaging System Nuclear imaging techniques - Thermography - Lasers in Medicine - Endoscopy.

UNIT- V

Assist And Therapeutic Devices: Cardiac pacemakers - Defibrillators - Artificial heart valves - Artificial Heart-Lung machine - Artificial Kidney - Nerve and Muscle Stimulators - Respiratory therapy equipment - Patient Monitoring System.

Learning Resources

Text Books:

1. Biomedical Instrumentation and Measurement, Leslie Cromwell, Fred J. Weibell and Erich A. Pfeifer., 2nd Edition, Pearson Education. 2006.

2. Handbook of Biomedical Instrumentation, R.S. Khandpur Tata McGraw Hill, 2nd Edition, 2006.

References:

1. Biomedical Instrumentation, M. Arumugam Anuradha Agencies Publications, 3nd Edition, 2006.

2. Medical Instrumentation Application and Design, John G. Webster, Wiley India, 3rd Edition, 2007.

Electronics & Communication Engineering

EC7T5A **Wireless Communications and Networks** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1period/week Semester end examination: 70 marks

Prerequisites: Computer networks (EC6T5)

Course Objectives

- Gain knowledge with regard to Wireless communication engineering including, digital communications and access technologies.
- Identify and understand Wireless communication networks and their evolution. Follow broadband networks trends
- Focus on Private wireless networks and their characteristics and current practices.

Learning Outcomes

Student will be able to

- Analyze the characteristics of different multiple access techniques in mobile/wireless communication.
- Design Wireless communication systems as per standards
- Develop new trends in Mobile/wireless communication.

UNIT-I

Multiple Access Techniques for Wireless Communication: Introduction, FDMA, TDMA, Spread Spectrum, Multiple access, SDMA, Packet radio, Packet radio protocols, CSMA protocols, Reservation protocols

UNIT-II

Introduction to Wireless Networking: Introduction, Difference between wireless and fixed telephone networks, Development of wireless networks, Traffic routing in wireless networks.

UNIT-III

Wireless Data Services: Common channel signalling, ISDN, BISDN, SS7, SS7 user part, signalling traffic in SS7.

Mobile IP and Wireless Access Protocol: Mobile IP Operation of mobile IP, Co-located address, Registration, Tunnelling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, Wireless datagram protocol.

UNIT-IV

Wireless LAN Technology: Infrared LANs, Spread spectrum LANs, Narrow band microwave LANs, IEEE 802 protocol Architecture and services, 802.11 medium access control, 802.11 physical layer.

Bluetooth: Overview, Radio specification, Base band specification, Links manager specification, Logical link control and adaptation protocol. Introduction to WLL Technology.

UNIT-V

Mobile Data Networks: Introduction, Data oriented CDPD Network, GPRS and higher data rates, Short messaging service in GSM, Mobile application protocol.

Wireless ATM & HiPER LAN: Introduction, Wireless ATM, HIPERLAN, Adhoc Networking and WPAN.

Learning Resources

Text Books

1. Wireless Communication and Networking – William Stallings, PHI, 2003.

2. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn., 2002.

References

1. Telecommunication switching systems and networks – Thiagarajan Viswanathan, PHI

2. Wireless Digital Communications – Kamilo Feher, PHI, 1999.

3. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, Pearson Education, 2002.

Electronics & Communication Engineering

EC 7T5B **Microstrip Antennas** **Credits: 3**

Lecture: 3 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Prerequisites: Microwave Engineering (EC6T3)

Course Objectives:

- To analyse the concepts of micro strip radiators.
- To design and analyse different types of antennas.
- To explore different antenna feeding techniques for real time implementation

Learning Outcomes

Student will be able to

- Conceptualize Microstrip radiators.
- Design and Analyse different types of antennas.
- Use different antenna feeding techniques.

UNIT-I

Microstrip Radiators-I: Definition, Advantages and Disadvantages, Applications of Micro strip Antenna, Radiation Mechanism of Microstrip antenna. Radiation Fields- Vector Potentials and Radiation field formulation, Micro strip antenna characteristics, and calculations.

UNIT-II

Microstrip Radiators-II: Various Microstrip antenna configurations- Microstrip Patch antenna, Printed Slot antenna, Printed Dipole antenna, Microstrip Traveling wave antenna. Surface Wave Phenomena

UNIT-III

Rectangular Microstrip Antennas: Transmission Line Model- Fringing effects, effective length, resonant frequency, Effective width, Design.

UNIT-IV

Circular Patch Antennas: Electric and Magnetic fields, Resonant Frequencies, Design, Equivalent Current densities and Fields Radiated, Conductance and Directivity, Resonant Input Resistance.

UNIT-V

Microstrip Antenna Feeds: Introduction, Coupling to Micro strip Patches- Co-planar Coupling to a single patch, Series array to Co-planar coupling, probe coupling, Aperture

Coupling, Electromagnetic Coupling. Parallel and Series Feed Systems- Parallel feeds for one and two dimensions, series feed for one dimension.

Learning Resources

Text Books

1. Micro strip Antenna Design Hand Book – Ramesh Garg, Prakash Bhartia,Inder Bahl, Apisak Ittipiboon, Artech House, second edition 2001
2. Antenna Theory –Constantine A. Balanis, Second Edition, John Wiley& Sons.2001.

References

1. Hand book of Microstrip Antennas, J.R. James and P.S.Hall, peter peregrinus Ltd.,London, 1st ed.,1989
2. Microwave Engineering using Microstrip Circuits- E.H.Fooks, .Zakarevicius, Prentice Hall, first edition, 1990.

Web Resources

1. https://rze-falbala.rz.e-technik.fh-kiel.de/~splitt/html/Mstrip40LabManual.pdf
2. http://elearning.vtu.ac.in/16/ENotes/Antenna%20&%20Propogation/E-Notes4AP/Unit3-HVK.pdf
3. www.iaeng.org/publication/WCE2011/WCE2011_pp1013-1016.pdf

Electronics & Communication Engineering

EC7T5C **Radar Systems** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Analog Communications (EC 4T5), Antennas & Wave Propagation (EC5T4), Microwave Engineering (EC6T3).

Course Objectives:

- To study the principles of operation of various blocks of Radar systems and Radar Range equation in detail.
- To study the functions of various blocks of CW Radar, FM-CW Radar, MTI and Pulse Doppler Radars, Tracking radar and their limitations and applications.
- To study the functions of various blocks of Radar receivers and detection of Radar signals in noise in detail.
- To study the principles and working of phased array antennas and their application to radar systems

Learning Outcomes:

Student will be able to

- Compare working of different types of radars.
- Analyze the statistical parameters of Noise and Radar cross section of targets
- Distinguish the fixed and moving targets using different types of radar systems
- Explain various techniques employed in radar receivers for detection of signals in noise.
- Observe the variation in parameters of radar system by the estimation of noise figure & noise temperature
- Identify the different types of display devices & duplexers

UNIT I

Nature of Radar: Maximum Unambiguous Range, Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets, Transmitter Power, PRF and Range Ambiguities, System Losses.

UNIT II

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

UNIT III

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters, Non-coherent MTI, MTI versus Pulse Doppler Radar.

UNIT IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one and two coordinates), Phase Comparison Monopulse.

UNIT V

Detection of Radar Signals in Noise : Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters Matched Filter with Non-white Noise. Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexers – Branch type and Balanced type.

Learning Resources

Text Books

1. Introduction to Radar Systems – Merrill I. Skolnik, 2nd Edition, McGraw-Hill, .

References

1. Introduction to Radar Systems – Merrill I. Skolnik, 3rd Edition, Tata McGraw- Hill,
2. Understanding Radar Systems – Simon kingsley, McGraw-Hill,1st edition., 1992
3. Radar Principles- Peyton Z. Peebles, Jr., Wiley India Pvt. Ltd., 2009

Web Resources

1. http://nptel.iitm.ac.in/courses.php?branch=Ece
2. http://www.radartutorial.eu/07.waves/wa04.en.html

Electronics & Communication Engineering

EC7T5D **Speech Processing** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Pre-requisites: Digital Signal Processing (EC5T6)

Course Objectives

- To introduce the fundamental concepts of speech
- To characterize the speech signal
- To disseminate speech recognition

Learning Outcomes

Student will be able to

- Analyze the speech production process
- Extract important features from speech for developing various speech systems
- Develop a proto-type speech recognizer using HMM models

UNIT- I

The Speech Signal: Fundamentals of Speech recognition, the process of speech production and perception in human beings, the speech production process, representing speech in time and frequency domains, speech sounds and features.

UNIT- II

Signal Processing and Analysis methods for Speech Recognition: Spectral analysis models, The Bank-of-filters front-end processor, Linear predictive coding model for Speech recognition, Vector quantization.

UNIT- III

Pattern Comparison Techniques: Introduction, Speech detection, Distortion measures- Mathematical considerations, Distortion measures- Perceptual considerations, Spectral distortion measures.

UNIT- IV

Theory and Implementation of Hidden Markov Models: Introduction, Discrete time Markov processes, Extensions to Hidden Markov models, Three basic problems for HMMs, Types of HMMs, Continuous observation densities in HMMs, comparison of HMMs, Implementation issues for HMMs, HMM system for isolated word recognition.

UNIT V

Large Vocabulary continuous speech recognition: Introduction, Subword speech units, subword unit models based on HMMs, Training of subword units, Language models for

Large vocabulary speech recognition, Statistical language modelling, Perplexity of the language model, Overall recognition system based on subword units.

Learning Resources

Text Books

1. Lawrence Rabiner and Biing-Hwang Juang, "Fundamentals of Speech Recognition", Pearson Education, 2007.

References

1. Claudio Becchetti and Lucio Prina Ricotti, "Speech Recognition", John Wiley and Sons, 1999.

2. Frederick Jelinek, "Statistical Methods of Speech Recognition", MIT Press, Cambridge, MA; London, England, 1997.

3. Daniel Jurafsky and James H Martin, "Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education, first edition, 2000.

Electronics & Communication Engineering

EC7T6 Managerial Economics and Financial Analysis Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives

- To introduce micro as well as macro, economic concepts that are useful in business decision making.
- To analysis various business situations with the help of various economic concepts.
- To help students better recognize the application of modern principles and methods of microeconomics to real-world business problems in different contexts.
- To master the basic tools of microeconomics: supply and demand analysis; firms' production and pricing decisions, market equilibrium and market structure analysis.
- The objective of this course is to acquaint the students regarding various accounting concepts and its application in managerial decision making.
- To enable the students to analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company.
- To introduce prospective managers of new ventures to prepare and analyse financial statements.
- To enable the students understand how organisations make important investment and financing decisions

Learning Outcomes

- Students will be able to
- Analyze various aspects of managerial economics, production & cost analysis, markets & pricing strategies.
- Develop an ability to identify, formulate, and solve engineering problems by applying the subject knowledge of Managerial economics.
- Apply capital budgeting, financial analysis techniques in evaluating various investment opportunities
- Enhance their capabilities in the interpretation of balance sheets are followed in industries, organizations & institutes.

UNIT-I

Introduction to Managerial Economics & Demand Analysis: Definition of Managerial Economics, Nature and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics. Demand Analysis: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

UNIT-II

Elasticity of Demand & Demand Forecasting: Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting (survey of buyers' Intentions, Delphi method, Collective opinion, Analysis of Time series and Trend projections, Economic Indicators, Controlled experiments and Judgmental approach).

UNIT-III

Theory of Production, Cost Analysis and Types of Industrial Organization: Production Function- Isoquants and MRTS, Law of variable proportions- Law of returns to scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs.-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP. Types of Industrial Organization: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company.

UNIT-IV

Introduction to Markets & Financial Accounting: Market structures, characteristics of market and Types of competition– pricing strategies. Financial Accounting: Introduction to Doubleentry system, Journal, Ledger, Trial Balance- Final account (with simple adjustments).

UNIT – V

Analysis of Financial Statement and Capital Budgeting: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency. Capital and Capital Budgeting: Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems)

Learning Resources

Text Books:

1. Managerial Economics and Financial Analysis, J.V.Prabhakar Rao, Maruthi Publications, 2011
2. Managerial Economics and Financial Analysis, N. Appa Rao. & P. Vijaya Kumar, Cengage Publications, New Delhi, 2011

References:

1. Managerial Economics and Financial Analysis, A R Aryasri, TMH, 2011
2. Managerial Economics, Suma damodaran, Oxford, 2011
3. Mangerial Economice & Financial Analysis, S. A. Siddiqui & A.S. Siddiqui , New Age International Publishers, 2011

Electronics & Communication Engineering

EC7L1 Microwave & Optical Communication Lab Credits: 2

Lecture: --- Internal assessment: 25 marks
Lab: 3periods/week Semester end examination: 50 marks

Prerequisites: Microwave Engineering (EC6T3), Optical Communications (EC 7T1)

Course Objectives:

- To understand the behavioral aspects of various microwave sources and optical sources
- To learn the measurement procedures of important parameters in microwave engineering and optical engineering

Learning Outcomes

Student will be able to

- Posses hands-on experience to work with microwave sources like reflex klystron, Gunn diode and optical sources like LED's & Lasers.
- Conduct measurements using a standard microwave test bench, analog and digital optical links for microwave and optical signal characteristics.

List of Experiments:

Part – A: (Any 7)

1. Reflex Klystron characteristics.
2. Gunn diode characteristics.
3. Attenuation measurement.
4. Directional coupler characteristics.
5. VSWR Measurement.
6. Impedance measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.

Part – B: (Any 5)

10. Characterization of LED.
11. Characterization of Laser diode.
12. Intensity modulation of laser output through an optical fiber.
13. Measurement of data rate for digital optical link.
14. Measurement of numerical aperture.
15. Measurement of losses in plastic fiber.

Electronics & Communication Engineering

EC7L2 **Digital Signal Processing Lab** **Credits: 2**

Lecture: --- Internal assessment: 25 marks
Lab: 3 periods/week Semester end examination: 50 marks

Course Objectives:

- To perform DSP algorithms like convolution, DFT & FFT in software using a computer language such as C with TMS320C6713 floating point Processor.
- To design the digital filter types like IIR-Butterworth, Chebyshev, Bilinear, Impulse invariant filters and FIR window-design methods using MATLAB.
- To gain a working knowledge of the design, implementation, and debugging of real time DSP algorithms written in C language or MATLAB for an industry-standard DSP processor.

Learning Outcomes:

Students will be able to

- Design & implement the digital active/passive filter in C and MATLAB programming environments
- Program a DSP chip with a variety of real-time signal processing algorithms such as filtering for noise reduction or digital audio effects
- compute and analyze signal spectrum of digital system using DFT/FFT algorithms in MATLAB
- generate waveforms using digital filter(s)
- develop & implement a real-time DSP project

List of Experiments

Part – A: (Using MATLAB)

1. Linear convolution of two sequences.
2. Circular convolution of two sequences.
3. DFT & IDFT of the given sequences.
4. Frequency response of analog LP and HP filters.
5. DFT of the given sequence using DIT-FFT / DIF-FFT.
6. Determination of Power Density Spectrum of a given signal.
7. IIR Low pass filter design (Butterworth and Chebyshev approximation).
8. IIR High pass filter design (Butterworth and Chebyshev approximation).
9. FIR Low pass filter design using windowing techniques.
10. FIR High pass filter design using windowing techniques.

Part – B: (Using Code Composer Studio)

9. Linear Convolution.
10. Circular Convolution.
11. Generation of Sine wave & Square wave.
12. Signal Processing using codec.

Electronics & Communication Engineering

EC 8T1 **TV & Satellite Communications** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Digital Communications (EC6T4), Antennas and Wave Propagation (EC5T4)

Course Objectives:

- To describe the basics of TV and Satellite Communications.
- To Explore the fundamental aspects of Digital TV
- To understand the orbital mechanics, its effects in communication system performance, launch vehicles and details of various satellite subsystems.

Learning Outcomes:

Students will be able to

- Analyze the effects of scanning and interlacing on composite video signal
- Conceptualize digital television.
- Acquaint with fundamentals of orbital mechanics in communication satellites.
- Design satellite subsystems and satellite antenna equipment.

UNIT –I

Basics of Television: Historical Background, The Eye-Brain Mechanism, The Scanning Standards, The Resolution Concept, The Composite Video Signal, The Spectrum of the Video Signal, Transmission Standards and Constraints.

UNIT- II

Digital Video Fundamentals: The Typical Black Box Digital Device, Sampling the Signal, Quantizing the Sampled Values, The Dynamic Range and the Head room Concept, The Quantizing error, The D/A Conversion.

UNIT-III

The Component Digital Standards: The sampling rates, The Coded Signals, The Sampling Frequencies, The Quantizing Range and the Implications

Digital Audio Fundamentals: Digital Audio Concepts, Digital Audio Interface Implementation, Audio Synchronization, Digital Audio Recording

UNIT-IV

Orbital Mechanics: Origin of Satellite Communications, Frequency allocations for Satellite Services, Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, Orbital effects in communication systems performance.

UNIT-V

Satellite Launchers: launchers and launch vehicles, Polar Satellite Launching Vehicle (PSLV)

Satellite Subsystems: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Spacecraft antennas

Learning Resources

Text Books

1. Digital Television Fundamentals; Michael Robin and Michel Poulin, Mc Graw Hill, Second Edition,2000
2. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.

References

1. Digital Television: A Practical Guide for Engineers, Walter Fischer and H. von Renouard, Springer-Verlag,2004
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

Web Resources

1. http://nptel.ac.in/courses/117105081/
2. http://nptel.ac.in/syllabus/syllabus.php?subjectId=117106103
3. http://nptel.ac.in/syllabus/syllabus.php?subjectId=117107036

Electronics & Communication Engineering

EC8T2A **DSP Processors and Architectures** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Computer Architecture & Organization (EC5T3)

Course Objectives:

- The purpose of this course is to introduce the concepts of DSP Processor and its architectures.
- To program DSP Processor for various applications.

Learning Outcomes

Student will be able to

- Select appropriate DSP processor for the required computational accuracies in DSP implementation.
- Implement DSP algorithms using DSP processors such as TMS 320C6X,TMS320C54X & its interfacing techniques with various I/O peripherals
- Effectively use MATLAB DSP toolbox for analysis & design of DSP system.

UNIT-I

Computational Accuracy in DSP Implementations: Number Formats for Signals and Coefficients in DSP Systems, Dynamic Range and Precision, Sources of Error in DSP Implementations, A/D Conversion Errors, DSP Computational Errors, D/A Conversion Errors.

UNIT-II

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

UNIT-III

Programmable Digital Signal Processors: Commercial Digital Signal-Processing Devices, Architecture of TMS320C54XX, TMS320C6X, Addressing modes and Assembly language instructions of TMS320C54XX, TMS320C6X.

UNIT-IV

Application Programs in TMS320C54XX: Pipeline operations, Code Composer Studio, Example programs.

UNIT-V

TMS320C6X Application Programs and Peripherals: Application programs in C64X, C67X, Internal memory, external memory, on-chip peripherals

Learning Resources

Text Books:

1. Digital Signal Processors (Architecture, programming and applications), B.Venkataramani and M.Bhaskar, Tata McGraw Hill Education pvt. Ltd., Second edition.
2. Digital Signal Processing, Avatar Singh and S.Srinivasan, Cengage learning 2004.

References:

1. Digital Signal Processing, Jonatham Stein, John Wiley , 2005

Web Resources:

1. http://en.wikipedia.org/wiki/Digital_signal_processor
2. http://www.scribd.com/doc/8968585/Architecture-of-DSP-Processors

Electronics & Communication Engineering

EC8T2B **Introduction to Avionics** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Switching Theory & Logic Design (EC3T6)

Course Objectives:

- To introduce role of avionics system and its architecture
- To understand the trends in display technology
- To understand the avionics system design development and integration using simulation tools
- To know modular avionics packaging and EMI/EMC requirements in avionics
- To study system assessment, validation, certification and maintenance of avionics

Learning Outcomes:

The student will be able to:

- Conceptualize systems and subsystems of avionics.
- Analyse trends in display technology
- Estimate life cycle costs for military and civil avionics
- Perform system assessment, validation, certification and maintenance of avionics system

UNIT- I

Overview: Role for Avionics in Civil and Military Aircraft systems, Avionics sub-systems and design, defining avionics System/subsystem requirements, Avionics system architectures

UNIT –II

AVIONICS SYSTEM ESSENTIALS: DISPLAYS, I/O DEVICES AND POWER: Trends in display technology, Alphanumeric displays, character displays etc., Civil and Military aircraft cockpits, MFDs, MFK, HUD, HDD, HMD, DVI, HOTAS, Synthetic and enhanced vision, situation awareness, Panoramic/big picture display, virtual cockpit-Civil and Military Electrical Power requirement standards, comparing the Military and Civil Requirements and Tips for Power System Design

UNIT- III

AVIONICS SYSTEM DATA BUSES, DESIGN AND INTEGRATION: MIL-STD-1553B, ARINC-429, ARINC-629, CSDB, AFDX and its Elements, Avionics system design, Development and integration-Use of simulation tools, standalone and integrated Verification and Validation

UNIT- IV

PACKAGING AND EMI/EMC : Modular Avionics Packaging, Trade-off studies, ARINC and DOD types, system cooling, EMI/EMC requirements BIT and CFDS, Automatic Test

Equipment, Speeds maintenance, ATLAS, Remote diagnostics and maintenance support-Life Cycle Costs for Military and Civil Avionics, Cash flow analysis

UNIT-V

SYSTEM ASSESSMENT, VALIDATION AND CERTIFICATION: certification requirements-Fault Tree analysis –Failure mode and effects analysis, Criticality and damaging modes and effects analysis, Software development process models, Software Assessment and Validation -Civil and Military standards, Certification of Civil Avionics.

Fault tolerant systems and Hardware and Software, Evaluating system design and Future architecture Hardware assessment-FARs guide certification

Learning Resources

Text Books

1. Collinson R.P.G. 'Introduction to Avionics', Chapman and Hall, 1996

2. Cary R .Spitzer, The Avionics Handbook, Crc Press, 2000

References

1. Spitzer, C.R. 'Digital Avionics Systems', Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987

2. Middleton, D.H. 'Avionics Systems', Longman Scientific and Technical, Longman Group UK Ltd., England, 1989

3. Jim Curren, Trend in Advanced Avionics, IOWA State University, 1992.

Web Resources

1. www.flightsafety.com/elearning

Electronics & Communication Engineering

EC8T2C **Electronic Measurements and Instrumentation** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Prerequisites: Electronic Devices and Circuits (EC2T5)
Network Analysis and Synthesis (EC3T4)

Course Objectives

- To study the performance characteristics of various electronic measuring instruments.
- To learn the principles of working of various signal generators and wave analysers .
- To understand the working principle of CRO, specifications, applications and study the working of various advanced CRO's and their applications.
- To understand the working principle of Q-Meters, various AC bridges and their applications.
- To learn the principles of operation of various active and passive transducers and data acquisition systems.

Learning Outcomes

Student will be able to

- Make use of signal generators, wave analyzers, oscilloscopes, and bridges for suitable measuring applications.
- Identify the use of active & passive transducers for measuring physical parameters.
- Analyze the principles of data acquisition systems.

UNIT- I

Performance characteristics of instruments: Static characteristics, Errors in Measurement, Dynamic Characteristics, DC Voltmeters- Multi range, Range extension, AC voltmeters-multi range, Range Extension, Thermo couple type RF ammeter, Ohmmeters series type, shunt type, Millimeteres for Voltage, Current and resistance measurements.

UNIT- II

Signal Generator& Wave Analyzers : Fixed and variable signal generators, AF oscillators, Standard signal generator, AF sine and square wave signal generators, Function Generators, Square & pulse generator, sweep generator. Basic wave analyzers, Frequency selective wave analyzers, Hetero- dyne wave analyzer, Harmonic Distortion Analyzers, Spectrum Analyzers.

UNIT- III

Oscilloscopes: Basic block diagram, CRT features, vertical amplifiers, horizontal deflection system, triggered sweep CRO,delay line , Dual beam CRO, Dual trace oscilloscope, Measurement of amplitude, period and frequency, Lissajous method of frequency measurement.

Sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, probes for CRO- Active & Passive, Frequency counter, Time and Period measurement.

UNIT- VI

Bridges: Wheatstone Bridge, AC Bridges Measurement of inductance- Maxwell's bridge, Measurement of capacitance - Schearing Bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter, Errors in Q meter.

UNIT- V

Transducers- Resistance, Capacitance, inductance, Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors, force, pressure, velocity, humidity, moisture, speed, proximity & displacement, Data acquisition system.

Learning Resources

Text Books

1. Electronic instrumentation, - H.S.Kalsi, Tata McGraw Hill, 2nd edition 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

References

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.twitter, Pearson Education, 2nd Edition, 2004.

Electronics & Communication Engineering

EC 8T2D **Global Positioning System (GPS)** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives

- To be able to utilize GPS/GIS applications and techniques for environmental inventory and research.
- To understand the mechanics of GPS/GIS, including software, hardware and available resources.
- To interpret and analyze data in a GIS environment.
- To gain 'real-world' experience while serving the local community through service-learning projects

Learning Outcomes

Student will be able to

- analyze GPS signals and their characteristics
- understand GPS errors and sources causing those errors
- simulate different algorithms of GPS using MATLAB programming and results can be analyzed to study different parameters
- Find new applications of GPS in medicine, transportation, manufacturing and engineering for the betterment of human life.

UNIT-I

Overview of GPS: Basic concept, system architecture, space segment, user segment.

GPS Signals: Signal structure, anti-spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

UNIT-II

GPS orbits and satellite position determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

UNIT-III

GPS Errors: GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

UNIT-IV

Parameterization and Algorithms of GPS Data Processing II: Non-Equivalent Algorithms: Standard Algorithms of GPS Data Processing, Preparation of GPS Data

Processing, Single Point Positioning, Standard Un-Differential GPS Data Processing, Equivalent Method of GPS Data Processing, Relative Positioning, Velocity Determination, Kalman Filtering Using Velocity Information

UNIT-V

Applications of GPS Theory and Algorithms: Software Development : Functional Library, Data Platform, A Data Processing Core, Concept of Precise Kinematic Positioning and Flight-State Monitoring: Introduction, Concept of Precise Kinematic Positioning, Concept of Flight-State Monitoring.

Learning Resources

Text Books:

1. GPS – Theory andPractice, B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, Springer–Wien, NewYork, 2001.
2. GPS Theory, Algorithms and Applications, Guochang Xu, 2nd Edition ,Springer

References:

1. Fundamentals of GPS receivers – A software approach, James Ba, Yen Tsui, John Wiley & Sons, 2001.

Electronics & Communication Engineering

EC8T3A **Project Management** **Credits: 3**

Lecture: 3 periods/week Internal Assessment: 30 Marks
Tutorial: 1 period /week Semester End Examination: 70 Marks

Prerequisites: -----

Course objectives

- To understand the phases in a Project Life Cycle
- Allocation of resources for different activities while planning a project.
- To analyze the working competence in the use of MS Project.

Learning outcomes

Student will be able to

- Evaluate and select the most desirable projects.
- Develop a suitable budget planning
- Identify important risks involved in a new project.
- Analyze appropriate methodologies to develop a project schedule.

UNIT I

Concepts of Project Management & Organizational Capability: Concepts of project management, categories, project life cycles, Roles and phases, tools and techniques. Types of organizational structures, cultures and its impacts on projects, project management roles

UNIT II

Quality Management: Quality concepts, project management plan, project quality tools, failure modes and effect analysis, Introduction to CMMI

UNIT III

Six Sigma: DMAIC methodology, project quality tools, 7-S of project management, problem solving and decision making, improving project performance and six sigma tools.

UNIT IV

Scheduling projects: Project time process management, purpose of project schedule, defining activities, sequence activities, develop project schedules, working with gantt chart, estimate resource needs, assigning resource to activity, using MS project for resource allocation

UNIT V

Risk Management: Risk identification, risk analysis, risk management planning. Cost planning and estimation, establishing cost control, Work Break Down Structure (WBS):

Definition of scope, Scope planning, work breakdown structure, using MS project for work breakdown structures, case study on "inventory system"

Learning Resources

Text Books:

1. Project management – S. Choudhary, Tata Mc.Grawhill – 2000.
2. Contemporary project management, Timothy J. Kloppenborg, Cengage learning, India Edition, 2009

References:

1. Project management – Harvey Maylor, Pearson, 3rd edition, 2004
2. Project management – Gido l Clements, Cengage learning, 2007
3. The six sigma project planner – Thomas Pyzdek, Tata Mc. Grawhill, 2003

Web Resources:

1. https://www.projectmanager.com/projectmanagementonline.php?gclid=CNbO86-E2MQCFdYXjgodIXAA_A
2. http://www.ganttic.com/
3. https://www.smartsheet.com/solutions/project-management

Electronics & Communication Engineering

EC 8T3B Industrial Management &Entrepreneurship Credits: 3

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- To enable the students the production planning as a pre-production activity involving arranging and designing the production and control systems.
- Demonstrate the impact of entrepreneurship on the economy and the support from Government and financial institutions.
- Enable the students to understand the role of Small Scale Industries and the Institutional support received by them.
- Analyze elements of the entrepreneurial mind set and discuss the implications for functioning as a successful entrepreneur.

Learning Outcomes

Students will be able to

- Design of organizational structure both industries and academia.
- Develop skill in Work analysis and material management that could help in efficient management of an enterprise.
- Analyse the role of entrepreneurs in the development of a country and the needed capabilities of an entrepreneurs.
- Understand the role of small scale industries and the institutional support provided by various organisations for business.
- Understand the new venture development and the role of creativity and innovation in the business

UNIT-I

Introduction: Management and Industrial Engineering and relation with other fields. **Plant Location and Layout:** General considerations, Types of Layout, Cellular Manufacturing. Scheduling: Scheduling In Job, Shop Type Production. Methods of Production Control.

UNIT-II

Work Analysis Material Management: Design of work methods, Time and motion study, Work sampling, Selection of labour and wage payment, Incentive and motivation. Inventory management, Deterministic and probabilistic models of Inventory control, Material requirements Planning, JIT, ERP, SCM Business process reengineering.

UNIT-III

Entrepreneur: Conceptual issues. Entrepreneurship vs. Management. Roles & Functions of an Entrepreneur, Types of Entrepreneur, Intrapreneur - an emerging Class. Stages in

entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship – its Barriers.

UNIT-IV

Small Scale Industry and Institutional Support: Definition; Characteristics; Need and rationale: Objectives; Scope; role of SSI in Economic Development. Government policy & Support for S.S.I. during 5 year plans.Supporting Agencies of Government for SSI. Meaning; Nature of Support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry.

UNIT-V

Entrepreneurship: Creativity and Innovation in Business. Creativity and Entrepreneurship Sources and Methods of Ideas Planning and Development of Programmes E-business Ventures; New Venture Management. Entrepreneurial Leadership in Turbulent Times. Ecological Entrepreneurship. International Business Opportunities.

Learning Resources

Text Books:

1. Elwood S.Buffa and Rakesh K.Sarin: "Modern Production/Operations Management", Wiley India, New Delhi, 2008.
2. Aswathappa K: "Production and Operation Management", Himalaya Publishing House, Mumbai.
3. Hisrich: Entrepreneurship, TMH,,New Delhi, 2009

References

1. Narayana Reddy: Entrepreneurship. Cengage learning, New Delhi,2010
2. Rajeev Roy: Entrepreneurship, Oxford University Press, New Delhi,2010
3. V.Gangadhar, Narsimha Chary: Entreprenuership Development, Kalyani Publishers, NewDelhi, 2001

Electronics & Communication Engineering

EC8T3C **Management Science** **Credits: 3**

Lecture: 3 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

- To develop knowledge of fundamental management concepts, skills and tools, to aid in problem solving and decision making.
- To develop and understanding about the organizational structure and relationship between authority and responsibility in various structures.
- To discuss the evolution of principles that make it possible to design facilities, processes, and control systems with a degree of predictability as to their performance.
- To develop comprehensive skills in planning, selecting, motivating, and developing the human resources for organisational effectiveness.
- To understand the broad scope of marketing, societal, ethical and other diverse aspects of marketing.
- To compare conceptual models of strategic management and to understand its applicability in understanding the constraints and opportunities in the sectors.
- To enable the students to understand the contemporary issues in the field of management science and their applicability in the real world at every level.

Learning Outcomes:

Students will be able to

- Design of organizational structure both industries and academia.
- Analyse various functions of management that include operations management, material management, marketing management, HR management helpful in success of organisations.
- Understand the importance of planning for the long-term through strategic management.
- Understand quality control standards & contemporary management practices being followed both in industries and academia.

UNIT – I

Introduction to Management: Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory and thinkers. Fayol's. Basic motivational theories. Leadership and Communication –its importance in management. **Designing Organisational Structures:** Basic concepts related to Organisation - Departmentation and Decentralisation. Types of organisation structures - their merits, demerits and suitability. Role of ethics and Social responsibilities of Management.

UNIT – II

Operations Management : Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement- Statistical Quality Control: chart, R chart, *c* chart, *p* chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality, Six sigma.

UNIT – III

Materials Management: Objectives, Need, procedure and Types of Inventory control, EOQ, Materials Requirement Planning (MRP), Just-In-Time (JIT), Total Quality Management (TQM), six sigma and Capability Maturity Model (CMM) Levels.

UNIT – IV

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution. **Human Resources Management (HRM):** Concepts of HRM & HRD. Basic functions of Human Resource Management. Grievance Handling and Welfare Administration, Performance Appraisal, Job Evaluation and Merit Rating. Performance Management.

UNIT – V

Strategic Management : Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Value Chain Analysis, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business Process Re-engineering Bench Marking, and Balanced Score Card.

Learning Resources

Text Books

1. Management Science, Aryasri, TMH, 2004.
2. Management Science, Rajesh C. Jampala, P. Adi Lakshmi, Duvuri Publications, Machilipatnam, 2010.

References

1. Kotler Philip & Kevin Lane Keller, Marketing Mangement . 12th Edition, PHI, 2005.
2. Koontz & Weihrich, Essentials of Management, 6th Edition, TMH, 2005.
3. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi, 2004.
4. Production and Operations Management, Kanishka Bedi, Oxford University Press, 2004.
5. Personnel Management, Memoria & S.V. Gauker Himalaya, 25th Edition, 2005.
6. Lawrence R Jauch, R.Gupta &William F.Glueck:Business Policy and Strategic Management, Frank Bros.2005.

Electronics & Communication Engineering

EC8T3D **Engineering Economics & Management** **Credits: 3**

Lecture: 4 periods/week Internal assessment: 30 marks
Tutorial: 1 period /week Semester end examination: 70 marks

Course Objectives:

1. To develop knowledge of fundamentals of management and economics concepts, skills and tools, to aid in problem solving and decision making.
2. To discuss the evolution of principles that make it possible to design facilities, processes, and control systems with a degree of predictability as to their performance.
3. To familiarize the students with macro-environmental forces affecting business operations in the Indian context; and the dynamics of the operation of these forces.
4. To develop the skill in the students regarding the project development and implementation.
5. To familiarize the student with widely used networking models related to decision-making, problem analysis and their interpretations in project management.

Learning Outcomes:

1. Students will be aware of the concept of Management and types of organization.
2. Students will understand the impact of various micro and macro economic variables that influence the organizational functions.
3. Student will analyze the cost volume relationship in the short run and long run.
4. Students will analyze various functions of management that include operations management, material management, helpful in success of organizations.
5. Student will develop skills regarding the project management inclusive of network project scheduling techniques.

UNIT- I

Introduction to Management:

Concepts of Management- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management. Internal and External Business Environment. , Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

UNIT-II

Elements of Engineering and Economics:

Micro and Macro Economics, Factors determining Demand, Law of Demand and its Exceptions Elasticity of Demand, Law of Diminishing Margin of returns, Law of returns to scale Iso-Cost and Iso-Quant Analysis,

UNIT III

Cost theory and Estimation:

Cost concepts, determinants of cost, cost-output relationship in the short run and long run Average total cost curve. Cost volume profit analysis.

UNIT- IV

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement, Business Process Reengineering. **Materials Management:** Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.

UNIT- V

Project Management (PERT/CPM): Network Analysis, Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems)

Learning Resources

Text Books

1. Management, Koontz, H and Wihrich.H McGraw, New York, 10th Edition, 1995.
2. Principles of Management, Ramasamy.T Himalaya Publishing House, New Delhi, 2000.
3. Managerial Economics and Financial Analysis, N. Appa Rao. & P. Vijaya Kumar Cengage Publications, New Delhi, 2011

References

1. Managerial Economics, Suma Damodaran Oxford, 2011
2. Managerial Economics and Financial Analysis, S.A. Siddiqui & A.S. Siddiqui, New Age International Publishers, 2011
3. Managerial Economics and Financial Analysis, N. Appa Rao. & P. Vijaya Kumar, Cengage Publications, New Delhi, 2011
4. Entrepreneurship Narayana Reddy, Cengage learning, New Delhi, 2010
5. Entrepreneurship, Rajeev Roy, Oxford University Press, New Delhi, 2010
6. Projects, Prasanna Chandra, Tata McGraw-Hill Education, 2009.