ELECTRONICS & COMMUNICATION ENGINEERING
COURSE STRUCTURE
B. Tech I Semester

S. No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EC1T01	HSMC	English	2	-	-	2	2
2	18EC1T02	BSC	Linear Algebra & Differential Equations	3	1	-	4	4
3	18EC1T03	BSC	Applied Physics	3	-	-	3	3
4	18EC1T04	ESC	Problem solving through C and Python	3	-	-	3	3
5	18EC1T05	ESC	Engineering Graphics	3	-	-	3	3
6	18EC1L06	HSMC	English Communication Skills Lab-1	-	-	2	1	1
7	18EC1L07	BSC	Applied Physics Lab	-	-	4	4	2
8	18EC1L08	ESC	Problem solving through C and Python Lab	-	-	4	4	2
9	18EC1T09	MC	Environmental Studies	2	-	-	2	-
							Total number of credits	**20**

Course Structure
B. Tech II Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EC2T01	HSMC	English-II	1	-	**2**	3	2
2	18EC2T02	BSC	Numerical Methods &Vector Calculus	3	-	-	3	3
3	18EC2L03	BSC	Applied Chemistry	3	-	-	3	3
4	18EC2T04	BSC	Biology for Engineers	2	-	-	2	2
5	18EC2T05	ESC	Basic Electronics & Electrical Engineering	3	-	-	3	3
6	18EC2T06	ESC	Data Structures using C	2	-	-	2	2
7	18EC2L07	BSC	Applied Chemistry Lab	-	-	3	3	1.5
8	18EC2L08	ESC	Basic Electronics & Electrical Engineering Lab	-	-	4	4	2
9	18EC2L09	ESC	Data Structures using C Lab	-	-	3	3	1.5
							Total number of credits	**20**

Course Structure for B. Tech III Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EC3T01	BSC	Probability Theory & Stochastic Processes	3	1	**0**	3	4
2	18EC3T02	PCC	Electronic Circuit Analysis	3	0	**0**	3	3
3	18EC3T03	PCC	Digital Electronics	3	0	0	3	3
4	18EC3T04	ESC	Network Theory	3	0	0	3	3
5	18EC3T05	PCC	Signals & Systems	3	0	0	3	3
6	18EC3T06	HSMC	Managerial Economics & Finance Analysis	3	0	0	3	3
7	18EC3L07	PCC	Electronic Circuit Analysis Lab	0	0	3	3	1.5
8	18EC3L08	PCC	Signals & Systems Lab	0	0	3	3	1.5
9	18EC3N09	MC	Constitution of India	2	0	0	2	0
							Total number of credits	**22**

Course Structure for B. Tech IV Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EC4T01	HSMC	Humanities (Effective Technical Communication)	3	0	0	3	3
2	18EC4T02	BSC	Physics of Materials	2	0	0	2	2
3	18EC4T03	PCC	Analog IC Applications	3	0	**0**	3	3
4	18EC4T04	PCC	Digital System Design Using HDL	3	0	0	3	3
5	18EC4T05	PCC	Electromagnetic Waves & Transmission lines	3	0	0	3	3
6	18EC4T06	PCC	Control Systems	3	0	0	3	3
7	18EC4L07	PCC	Analog IC Applications Lab	0	0	3	3	1.5
8	18EC4L08	PCC	Digital System Design Using HDL Lab	0	0	3	3	1.5
9	18EC4L09	Project	Mini Project	0	0	4	4	2
							Total number of credits	**22**

Course Structure for B. Tech V Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EC5T01	PCC	Analog and Digital Communications	3	0	0	3	3
2	18EC5T02	PCC	Microcontroller and Microprocessors	3	0	0	3	3
3	18EC5T03	PCC	Digital Signal Processing	3	0	0	3	3
4	18EC5T04	HSMC	IPR & Patents	2	0	0	2	2
5	18EC5T05 18EC5T06 18EC5T07	OEC	Open Elective-1	3	0	0	3	3
6	18EC5L08	PCC	Microcontroller and Microprocessors Lab	0	0	3	3	1.5
7	18EC5L09	PCC	DSP Lab	0	0	3	3	1.5
8	18EC5L10	PCC	Communication Systems Lab	1	0	2	3	2
9	18EC5N11	MC	Essence of Indian Traditional Knowledge	2	-	-	2	0
							Total number of credits	**19**

Course Structure for B. Tech VI Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18EC6T01	PCC	VLSI Design	3	0	0	3	3
2	18EC6T02	PCC	Antenna and wave propagation	3	0	0	3	3
3	18EC6T03 18EC6T04 18EC6T05	PEC	Professional Elective1	3	0	0	3	3
4	18EC6T06	ESE	OOPS Through JAVA	3	0	0	3	3
5	18EC6T07 18EC6T08 18EC6T09	OEC	Open Elective-2	3	0	0	3	3
6	18EC6L10	PCC	VLSI LAB	1	0	2	3	1.5
7	18EC6L11	ESE	OOPS Through JAVA LAB	1	0	2	3	1.5
8	18EC6P11	Projects	Technical Seminar	1	0	0	1	1
							Total number of credits	**19**

Course Structure for B. Tech VII Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contac t Hours	Credits
				Lecture	Tutorial	Practical		
1	18EC7T01	PCC	Embedded Systems	3	0	0	3	3
2	18EC7T02	PCC	Microwave Engineering	3	0	0	3	3
3	18EC7T03 18EC7T04 18EC7T05	PEC	Professional Elective-2	3	0	0	3	3
4	18EC7T06 18EC7T07 18EC7T08	PEC	Professional Elective-3	3	0	0	3	3
5	18EC7T09 18EC7T10 18EC7T11	OEC	Open Elective-3	3	0	0	3	3
6	18EC7L12	PCC	Microwave & OC LAB	1	0	2	3	2
7	18EC7P13	Projects	INDUSTRIAL INTERNSHIP	0	0	2	2	2
							Total number of credits	**19**

Course Structure for B. Tech VIII Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contac t Hours	Credits
				Lectu re	Tutori al	Practic al		
1	18EC8T01	PCC	Coding Theory & Techniques	3	0	0	3	3
2	18EC8T02 18EC8T03 18EC8T04	PEC	Professional Elective-4	3	0	0	3	3
3	18EC8T05 18EC8T06 18EC8T07	OEC	Open Elective-4	3	0	0	3	3
4	18EC8T08 18EC8T09 18EC8T10	OEC5/ MOOCS	Data Communication& Networking Renewable Energy sources twork Security & Cryptography	2	0	0	2	2
5	18EC8P11	PROJECTS	PROJECT	0	0	16	16	8
6	18EC8L12	Lab course	Comprehensive Viva Voice					0
							Total number of credits	**19**

LIST OF OPEN ELECTIVES

OPEN ELECTIVE-I **(V SEM)**

S No	Course Code	Title of the Course	Offered by Dept	Chosen by
1	18EC5T05	Quantitative Aptitude & Reasoning	BED	ECE
2	18EC5T06	Solid State Devices and Circuits	ECE	ECE,EEE
3	18EC5T07	Principals of Communication	ECE	EEE,CSE

OPEN ELECTIVE-II **(VI SEM)**

S No	Course Code	Title of the Course	Offered by Dept	Chosen by
1	18EC6T07	Employability skills 2	BED	ECE
2	18EC6T08	Computer Networks	CSE	ECE
3	18EC6T09	Embedded Systems	ECE	CSE

OPEN ELECTIVE-III **(VII SEM)**

S No	Course Code	Title of the Course	Offered by Dept	Chosen by
1	18EC7T09	Computer Architecture & Organization	CSE	ECE
2	18EC7T10	Bio Medical Instrumentation	ECE	ECE,EEE,CSE,ME
3	18EC7T11	Nano Electronics	ECE	ECE,CSE,EEE

OPEN ELECTIVE-IV **(VIII SEM)**

S No	Course Code	Title of the Course	Offered by Dept	Chosen by
1	18EC8T05	Operating Systems	CSE	ECE
2	18EC8T06	Soft Computing Techniques	ECE	ECE,CSE,EEE
3	18EC8T07	Mechatronics	ECE	ME

LIST OF PROFESSIONAL ELECTIVES

PROFESIONAL ELECTIVE-I **(VI SEM)**

S No	Course Code	Title of the Course
1	18EC6T03	Cellular Mobile Communication
2	18EC6T04	Internet of Things
3	18EC6T05	Digital Signal Processor and Architecture

PROFESSIONAL ELECTIVE-II **(VII SEM)**

S No	Course Code	Title of the Course
1	18EC7T03	Wireless Sensor Network
2	18EC7T04	Radar Engineering
3	18EC7T05	Digital Image Processing

PROFESSIONALELECTIVE-III **(VII SEM)**

S No	Course Code	Title of the Course
1	18EC7T06	Satellite Communication
2	18EC7T07	Consumer Electronics
3	18EC7T08	Optical Communication

PROFESSIONAL ELECTIVE-IV **(VIII SEM)**

S No	Course Code	Title of the Course
1	18EC8T02	Spread Spectrum Communication
2	18EC8T03	Statistical Signal Processing
3	18EC8T04	Electronic Measurements & Instrumentation

SEMESTER- I

SYLLABUS

18EC1T01: ENGLISH-1

Scheme and Credits: L:2 T:0 P:0 C:2

Prerequisites: -

Course Outcomes

1. CO 1: Use English language, both written and spoken, competently and correctly.
2. CO 2: Improve comprehension and fluency of speech.
3. CO 3: Gain confidence in using English in verbal situations.
4. CO 4: Hone the communication skills to meet the challenges of their careers very successfully.
5. CO 5: Strengthen communication skills in different contexts like formal and informal.
6. CO 6: Develop knowledge of different fields and serve the society accordingly

Syllabus:

Unit 1 Human Resources

Ideal Family

Unit 2 In London

Verger

Unit 3 Our Living Environment

Three Days to See

Unit 4 Energy: Alternative Sourcesb) War

Unit 5 Principles of Good Writing

Letter Writing

References:

1. English for Engineers and Technologists, Orient Blackswan
2. Prose for Communication, Ravindra Publishing House
3. Panorama, Oxford University Press

18EC1T02: LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS

Scheme and Credits: L:3 T:1 P:0 C:4

Prerequisites: -

Course Outcomes:

- Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
- Illustrate the methods of computing eigen values and eigen vectors
- Able to analyze the real life situations, formulate the differential equations then apply the solving methods
- Explain the techniques of solving the linear differential equations
- Optimize functions of several variables and able to find extreme values of constrained functions

Syllabus:

UNIT I: Linear systems of equations, Eigen values & Eigen vectors

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence, Consistency of linear system of equations, System of linear homogeneous equations. Gauss - Jordan method, LU decomposition method, **Application:** Finding the current in electrical circuits, Eigen values, Eigen vectors, Properties of Eigen values (without proofs).

UNIT II: Quadratic forms & Differential calculus:

Cayley-Hamilton theorem (without proof), Reduction to diagonal form, Reduction of quadratic form to canonical form, Nature of quadratic form. Limits and continuity and differentiability, Mean value theorems, Taylor‘s and Maclaurin‘s series. Functions of two variables, Partial derivatives, Homogeneous functions, Total derivative, Jacobian, Taylor‘s theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange‘s method of undetermined multipliers.

UNIT III: Differential equations of first order:

Formation of a differential equation, Solution of a differential equation, Variables separable method, Linear equations, Bernoulli‘s equation, Exact differential equations. Equations reducible to exact equations, **Applications:** Orthogonal Trajectories, Newton‘s Law of cooling, Rate of decay & growth.

UNIT IV: Differential equations higher order:

Definitions, Complete solution, Operator D, Rules to find Complementary function, Inverse operator, Rules to find the particular integral(RHS term of the type e^{ax} , Sin(ax+b), cos(ax+b), polynomials in x). Rules to find the particular integral (RHS term of the type e^{ax} V(x), any other

function), Method of variation of parameters. **Application:** L-C-R circuits.

UNIT V: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t. Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application**: Application to differential equations.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rdEdition, 2014.
2. B. V. RAMANA**,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi
2. Publications, 9th Edition, 2014.
3. ERWIN KREYSZIG**,** Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.

18EC1T03: APPLIED PHYSICS

Scheme and Credits: L:3 T:0 P:0 C:3

Prerequisites: -

Course Outcomes

CO1: Study of lasers and optical fibers with an emphasis of their application in communication in particular.

CO2: Outline the principles of Quantum mechanics to understand the principles of solid state materials for use in engineering applications.

CO3: The Analytical study of response of materials to Electromagnetic fields.

CO4: To study various magnetic and dielectric materials and their Engineering applications.

CO5: To Gain knowledge on the physics of semiconductors for their engineering applications.

UNIT –I

LASERS

Characteristics of Lasers – Spontaneous and Stimulated Emission – Population Inversion - Einstein Coefficients – Ruby Laser – He-Ne Laser – Recording and Reconstruction of Holography-Applications.

OPTICAL FIBERS

Principle of Optical fiber – construction – Acceptance angle – Numerical Aperture – Types of Optical fibers – Single and Multi mode, Step Index and Graded Index fibers — Advantages of Optical Fibers in Communication – Applications in Communication.

UNIT – II

QUANTUM THEORY OF SOLIDS

Matter waves – Physical significance of wave function – Schrodinger‘s Time independent wave equation.Schrodinger‘s Time dependent wave equation - Particle in a 1 Dimensional Potential well.

UNIT-III

ELECTROMAGNETIC FIELDS

Grad – Div – Curl – Gauss and Stoke‘s theorems – Fundamental Laws of Electromagnetism.

Maxwell‘s Equations – Poynting vector – Propagation of Electromagnetic waves in a dielectric medium.

UNIT-IV

MAGNETIC MATERIALS

Origin of magnetic moment – Classification of magnetic materials (Dia, Para, Ferro) - Weiss theory of Ferromagnetic domains – Hysteresis – Soft and Hard magnetic materials - Applications.

DIELECTRIC MATERIALS

Types of Polarization – Dielectrics in DC and AC fields – Internal field – Clausius Mossoti Equation – Dielectric Loss and Dielectric Breakdown – Ferroelectric Hysteresis and applications.

UNIT-V

PHYSICS OF SEMICONDUCTORS

Carrier Concentration in Intrinsic semiconductor – Fermi level and electrical conductivity in intrinsic semiconductors - Carrier Concentration in Extrinsic semiconductors – Variation of Fermi level with temperature and impurity concentration. Drift and Diffusion currents – Einstein‘s relation – Hall Effect & its applications.

Text Books:

1. Engineering Physics by R.K.Gaur and S.L.Gupta – Dhanpatrai Publications
2. Engineering Physics by M.Avadhanulu and P.G. Kshirasagar – S Chand Publications (10th Edition)
3. Applied Physics by S.O.Pillai – New Age Publications – (3rd Edition)

Reference Books:

1. Engineering Physics by P.K.Palanisamy – Scitech Publications (2014 Edition)
2. Engineering Physics by M.Armugam – Anuradha Publications
3. Engineering Physics by M.R.Srinivasan (2014 Edition) New Age International Publications

18EC1T04: Problem Solving through C and Python Scheme and

Credits: L:3 T:0 P:0 C:3

Prerequisites: -

Course Outcomes

The student will learn

- To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To use structures and files

Syllabus:

UNIT I

INTRODUCTION TO COMPUTERS

Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process.

BASICS OF C PROGRAMMING:

Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

UNIT II

Decision making statements: if, if else, nester if. Muti way decision making statements: else if, Switch statement **Looping statements**: while, do while, for, Compilation process

UNIT III

Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, Two dimensional arrays, Matrix Operations, Multi dimensional Arrays

Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

UNIT IV FUNCTIONS

Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion , Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

POINTERS

Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation.

UNIT V

STRUCTURES AND UNIONS

Structure , Nested structures , Pointer and Structures , Array of structures , Example Program using structures and pointers , Self referential structures, Unions.

INTRODUCTION TO PYTHON PROGRAMMING

Programming Using the REPL (Shell), Running Python Scripts, Variables, Assignment, Keywords, Input- Output, Indentation. Data Types, Operators, Expressions and order of evaluations, Control Flow- if, if- elseif-else

Text Books:

1. Reema Thareja, –Programming in C‖, Oxford University Press, Second Edition, 2016.
2. Krnighan. B.W and Ritche, D.M, –The C Programming Language‖, Second Edition, Pearson Education, 2006
3. Pradep dey, Manas Ghosh, –Fundamentals of Computing and programming in C‖, First Edition, Oxford University Press, 2009.
4. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

References:

1. Paul Deitel and Harvey Deitel, ―C How to Program‖, Seventh Edition, Pearson Publication.
2. E Balagursamy, –Programming in C, Sixth Edition, Tata McGraw Hill.
3. Ajay Mittal, ―Programming in _C‘ A practical Approach‖, Pearson education
4. Learning Python, Mark Lutz, Orielly

18EC1T05: ENGINEERING GRAPHICS

Scheme and Credits: L:3 T:0 P:0 C:3 Prerequisites: -

Course Outcomes:

CO1: Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles. **CO2**: Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.

CO3: Draw the projections of planes.

CO4: Draw the projections of solids

CO5: Convert Orthographic projections to isometric projection and vice versa.

Syllabus:

UNIT I:

Lettering, Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods.

Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes- Tangent and Normals to the above curves.

UNIT II:

Orthographic projections: Introduction, Projections of points.

Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT III

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

UNIT IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

UNIT V: Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views. Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications
2. Engineering Drawing +Auto CAD, K Venugopal &V Prabhuraja, Newage Publishers.

2**Reference Books:**

1. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree, K. C. John, PHI Publishers
3. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
4. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

18EC1L06:ENGLISH COMMUNICATION SKILLS LAB-1

Scheme and Credits: L:0 T:0 P:2 C:1 Prerequisites: -

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

List of Experiments:

1. **Greetings and Introduction**
2. **Request Permission & Giving Directions**
3. **Inviting/Complaining/Congratulating**
4. **Root Words**
5. **Phonetics-Sounds and Symbols**
6. **Pronunciation Rules**

References:

1. ***Strengthen Your Steps,*** Maruti Publications
2. ***Interact,*** Orient Blackswan
3. ***Word Power Made Easy***, Pocket Books

18EC1T07: APPLIED PHYSICS LAB

Scheme and Credits: L:0 T:0 P:3 C:2

Prerequisites: -

(Any 10 of the following listed experiments)

LIST OF EXPERIMENTS:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton‘s rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating.
5. Determination of Numerical Aperture and bending loss of a given optical fiber.
6. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
8. Verification of laws of vibrations in stretched strings - Sonometer
9. Determination of Young‘s modulus by method of single cantilever oscillations.
10. Melde‘s experiment – Transverse and Longitudinal modes.
11. Magnetic field along the axis of a current carrying coil – Stewart and Gee‘s apparatus.
12. L- C- R Series Resonance Circuit.
13. Study of I/V Characteristics of Semiconductor diode.
14. I/V characteristics of Zener diode.
15. Energy Band gap of a Semiconductor p - n junction.

18EC1L08: Problem Solving Lab using C and Python

Scheme and Credits: L:0 T:0 P:4 C:2

Prerequisites: - Syllabus:

1. Write a C program to convert temperature from Fahrenheit to Celsius.

a. Write a C program to find the roots of a quadratic equation.

b. Write a program to implement simple calculator using switch case

2. Write a C program to determine if the given number is a prime number or not. Write a program to display the factorial of a given number

3. Write a program to display whether a given is Armstrong or not

Write a C program to generate the first n terms of the Fibonacci sequence.

4. Write a C program to display the reverse of a given number.

Write a C program to calculate the following sin and cos value

5. Write a program for sorting numbers in a list.

6. Write programs for searching a number in the list using

a. Linear search

b. Binary search

7. Write programs that reads two matrices to perform the following:

a. Addition of two matrices

b. Multiplication of two matrices

8. Write a program to perform the following operations without using build in string operations:

a. To display the length of the string.

b. To check whether the string is palindrome or not

c. To delete n characters from a given position in a given string.

9. Write a program to generate GCD of two numbers using functions

10. Write a C program that reads two integers n and r to compute the ncr value using the following relation: $n_{cr}(n, r) = n! / r! (n,r)!$. Use a function for computing the factorial value of an integer.

11. Write programs for the following using recursive functions

    a. Factorial of a given number

    b. GCD of two numbers

c. Fibonacci series

12. Write a program to demonstrate call by value and call by reference.
13. Write a program to perform following operating using pointers
    a. Reverse of a string
    b. Comparison of two strings
14. Write a program for displaying the details of the student by sorting them according to the marks using structure containing roll no, name and marks.
15.
    a. Running instructions in Interactive interpreter and a Python Script
    b. Write a program to purposefully raise Indentation Error and correct it

16..
    a. Write a python program to compute distance between two points taking input from the user(Pythagorean Theorem)
    b. Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

17. Write a Program for checking whether the given number is an even number or not.

18EC1T09: ENVIRONMENTAL STUDIES

Scheme and Credits: L:2 T:0 P:0

C:0 Prerequisites: -

Course Outcomes

- **CO1** The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
- **CO2** The concepts of the ecosystem and its function in the environment
- **CO3** The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- **CO4** The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- **CO5** The environmental legislations of India and Social issues and the possible means to
- **CO6** Environmental assessment and the stages involved in EIA.

Syllabus

UNIT-I MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of **Environmental** Studies- Importance of **Environmental** Studies- Need for public awareness,Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference,Earth summit.

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^{o}production& 2^{o}production- Major ecosystems: Forest ecosystem- Grassland ecosystem, Desert ecosystem- Aquatic ecosystem: pond, Lake Ecosystem- Streams, river ecosystem, Oceans

UNIT-II : NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources- Forest resources**:** Use and over-exploitation- Deforestation-Timber extraction-Mining- Conservation- Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management- Energy resources**:** renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal- petroleum-natural gas-Nuclear energy

UNIT-III: **BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity- Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India- Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

UNIT-IV: ENVIRONMENTAL PROBLEMS

Global warming,Climate change- Acid rain , Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures- Pollution case studies- Role of an individual in prevention of pollution

UNIT-V: ENVIRONMENTAL LEGISLATION &MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act- Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi

SEMESTER-II

SYLLABUS

18EC2T01: ENGLISH II

Scheme and Credits: L:1 T:0 P:2 C:2 Prerequisites: -

Syllabus:

Unit 1 **Transport: Problems and Solutions The Scarecrow**

Unit 2 **The Drunkard**

A Village Lost to the Nation

Unit 3 **Evaluating Technology The Knowledge Society**

Unit 4 **Industry: Safety and Training Martin Luther King and Africa**

Unit 5 **Man's Peril (Detailed) Report Writing**

References:

1. **English for Engineers and Technologists,** Orient Blackswan
2. **Prose for Communication,** Ravindra Publishing House
3. **Panorama,** Oxford University Press

ENGLISH COMMUNICATION SKILLS LAB II

1	**a.**	Introducing Yourself and Other People
		Employability Skills
	b.	Introduction to Soft Skills
		My Skills, My Strengths
2	a.	Discussing Daily Routines
		Free Time Activities
	b.	Describing Family
		Talking about Family
3	a.	Giving Directions
		Ordering Food
	b.	Asking for and Paying the Bill
		Describing Appearances and Personality
4	a.	Writing a Product Description-1
	b.	Writing a Product Description-2
5	a.	Describing an Advertised Job
		Skills Needed for Different Jobs
	b.	What Kind of Job Are You Interested in?
		Finding out about a Job
6.	a.	Managing Nerves in a Presentation
	b.	Learning about Presentations

Reference:

Online Resources:

https://goo.gl/v57WHe http://www.careerbuilder.co.in https://goo.gl/w3FweC https://goo.gl/4GoueJ etc.

18EC2T02: NUMERICAL METHODS &VECTOR CALCULUS

Scheme and Credits: L:3 T:0

P:0 C:3 Prerequisites: -

Syllabus:

UNIT I: Numerical Solution of Equations:

Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method (one variable).Newton-Raphson method (non-linear simultaneous equations), Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT II: Numerical Integration & Numerical Solution of ODE:

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules.**Numerical Solution of ODE:** Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta method of 4^{th} order.

UNIT III: Special functions & Multiple integrals:

Special functions: Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

Multiple Integrals: Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Cartesian to Cylindrical & Cartesian to Spherical polar coordinate systems). **Applications:** Area enclosed by plane curves, Volume of solids.

UNIT IV: Vector Calculus:

Vector Differentiation: Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, Del applied to vector point functions-Div & Curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

Vector Integration: Line integral, Green's theorem in the plane (without proof), Surface integrals, Stokes theorem (without proof), Volume integral, Gauss Divergence theorem (without proof).

UNIT V: Complex Variables:

Introduction, Complex function, Limit and continuity of a complex function, Derivative of f(z), Analytic functions, Harmonic functions & orthogonal system, Milne-Thomson method.

Applications: Applications to flow problems. **Complex Integration & Series Expansion:**

Complex integration, Cauchy‘s theorem and Cauchy‘s integral formula (without proofs), Series of complex terms, Taylor‘s series and Laurent‘s series (without proofs).

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.
2. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.

18EC1T03: APPLIED CHEMISTRY

Scheme and Credits: L:3 T:0

P:0 C:3 Prerequisites: -

Course Outcomes

CO1: Study of polymers and composite materials enable us to use them in a good number of engineering fields

CO2: Industries are run by the quality of fuels and energy crisis can be met by broad understanding of different fuels

CO3: Electrochemical principles form the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by understanding the science of corrosion.

CO4: Study of the existing developed materials forms a basis for developing more number of advanced materials

CO5: Methods of purification of water can be known so that more of them can be developed

CO6: The importance of engineering materials in the domestic and engineering fields can be understood.

Syllabus:

UNIT I: POLYMERS AND PLASTICS

Introduction- Degree of polymerization-functionality-tacticity-Types- Addition polymerization-Definition- PVC-Properties-applications, condensation polymerization-Bakelite-Properties-applications Physical and mechanical properties – Conducting polymers– Biodegradable polymers-applications– Natural rubber- Disadvantages - Compounding of rubber - vulcanization – Synthetic rubber: Thiokol -Thermoplastics and Thermosetting plastics –- Composite materials & Fiber reinforced plastics

UNIT II: BASICS OF ELECTRO CHEMISTRY AND CORROSION

Galvanic cell - Electro chemical series - Standard electrodes (Hydrogen and Calomel electrodes) Primary cells: Zinc – air cell,Secondary cells:- Lithium ion batteries, Pb-acid cell, *Fuel cells:*- H_2-O_2 fuel cell and molten carbonate fuel cells ***Corrosion:*** Dry Corrosion– Wet (Electrochemical) Corrosion –Factors influencing the rate of corrosion – Protection from corrosion – Cathodic protection – Electro plating - Electroless plating

UNIT III: NON CONVENTIONAL ENERGY SOURCES

Solar Energy: - Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance,

Non-conventional energy sources:

i. Hydropower include setup a hydropower plant (schematic diagram)

ii. Geothermal energy: Introduction-schematic diagram of a geothermal power plant
iii. Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
iv. Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
v. Biomass and biofuels

UNIT IV: SEMICONDUCTORS AND SUPER CONDUCTORS

Non –Elemental Semi conductors: Stoichiometric, Non- Stoichiometric ,Controlled valency & Chalcogen photo/semiconductors- Preparation of Semiconductors Ge & Si by crystal pulling technique – purification by Zone refining. Semiconductor Devices:- Diode –Transistor, **Super conductors:-**Definition-Types-Characteristics –applications

UNIT V: ADVANCED MATERIALS AND GREEN CHEMISTRY

Nano materials:-Introduction –General methods of preparation (top down and bottom up)

Liquid Crystals-Definition, classification, applications, ***Green synthesis:*** **-** Introduction- Principles - methods of synthesis– alternative reactive media (aqueous phase method) and alternative energy sources (microwave method) -R4M4 principles-Econoburette.

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

UV Spectroscopy- Basic principle-Instrumentation- Applications, IR Spectroscopy- Basic principle-Instrumentation- Applications, NMR Spectroscopy- Basic principle-Instrumentation- Applications, Analytical techniques: FE-SEM, TEM, BET, Chromatography techniques: Paper chromatography, Thin layer chromatography- applications

Standard Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

Reference Books:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

18EC2T04: Biology for Engineers

Course Outcomes

After studying the course, the student will be able to:

CO 1: Understand how biological observations lead to major discoveries and the morphological, Biochemical and ecological classification of organisms.

CO 2: Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms.

CO 3: Classify enzymes and distinguish between different mechanisms of enzyme action and Study the chemical reactions that are catalyzed by enzymes. Apply thermodynamic principles to biological systems and able to understand major chemical processes that occur within a living organism in order to maintain life.

CO 4: Identify DNA as a genetic material in the molecular basis of information transfer.

CO 5: Identify and classify microorganisms, understand media compositions and growth of Microorganisms

Unit I: Introduction

Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry. Classification of organisms based on (a) Cellularity- Unicellular or Multicellular, (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life.

Unit II: Biomolecules

Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function. Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit III: Enzymes & Metabolism

Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters. Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

Unit IV: Information Transfer

Concept of genetic code. Molecular basis of information transfer; Transcription and translation.

Unit V: Microbiology

Concept of species and strains, Identification of Microorganisms. Sterilization and media compositions, Growth kinetics.

Text/Reference Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.Brown Publishers

18EC2T05: Basic Electronics and Electrical

Engineering Scheme and Credits: L:3 T:1 P:0 C:4

Prerequisites:

- Course

Outcomes

- To understand and analyze basic Electrical circuits
- To study the working principles of Electrical Machines
- .to understand the concepts of power generation and transmission
- To introduce components of Electrical Installations
- To understand various electrical safety measures
- To understand the concepts and applications of electronic devices

SYLLABUS

Unit – I: Diodes

PN junction diode- Energy band diagram of PN junction Diode- V-I Characteristics -Current components in PN junction Diode- Diode equation- Diode resistance and capacitance- Characteristics of Zener Diode- Varactor Diode- SCR and UJT.

Unit-II: Rectifiers & Wave Shaping:

Half wave, Full wave Rectifier and Bridge rectifier- Derivations of characteristics of rectifiers- Filters- Inductive and Capacitive filters- Non Linear Wave shaping Circuits.

Unit-III: Transistor Characteristics:

Bipolar Junction Transistor- Transistor current components- Transistor equation- Transistor configurations- Characteristics of a transistor in CB,CC & CE configurations- Transistor as a Switch- Transistor as an amplifier.

Transistor Biasing and stabilization

Introduction- Different Biasing Methods- Fixed bias, Collector to Base bias & voltage divider bias- Stabilization against variations in V_{BE}, I_C & β- Stabilization factors- Bias compensation, Thermal Runaway- Thermal Stability.

Unit-IV: Field Effect Transistors (FET):

Junction Field Effect Transistor construction & operation- characteristics CS, CD & CG- FET Biasing methods and stabilization- **MOSFET:** Metal Oxide Semiconductor Field Effect Transistor- Types- Construction- Operation & characteristics

Unit V: Electrical Devices

Transformers – Operation, working Principle and types – Motors – AC, DC, Servo & Synchros – Operations & Working Principle – Applications of Electrical Devices

Text Books:

1. 1.Electronic Devices & Circuits –J.Millman, C.Halkias, Tata Mc-graw Hill,2nd Edition
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGraw Hill, 2nd Edition
3. D. P. Kothari and I. J. Nagrath, ―Basic Electrical Engineering‖, Tata McGraw Hill, 2010.

Reference Books:

1. D. C**.** Kulshreshtha, ―Basic Electrical Engineering‖, McGraw Hill, 2009.
2. Basic Electronic Circuits -V.K.Mehta,S-chand Publications,2008.
3. Electronic Devices & Circuits-David-A-Bell,oxford University Press 5th Edition.

18EC2T06: DATA STRUCTURES USING C

Scheme and Credits: L:2 T:0 P:0 C:2

Prerequisites: Problem solving

using C Course Outcomes

The student will learn

- To implement linked list and its applications
- To implement stacks
- To implement queues.
- To implement trees.
- To implement graphs
- To sort arrays using different techniques

Syllabus:

UNIT I Linear Data Structures- List

Abstract Data Types (ADTs), List ADT, Array based implementation, linked list implementation, singly linked lists, circularly linked lists, doubly linked lists, applications of lists, Polynomial Manipulation

UNIT II

Linear Data Structures-Stacks

Stack ADT, Array Representation of Stacks, Operations, Linked Representation of Stacks, Evaluating arithmetic expressions, Conversion of Infix to postfix expression

Linear Data Structures- Queues

Queue ADT, Array Representation of Queues, Linked Representation of Queues, Circular Queue, applications of Queues.

UNIT III Non Linear Data Structures- Trees

Introduction, Types of Trees, Tree traversals- In order, Preorder, Post order and Level order , Binary Search Tree, Operations on Binary Search Tree ,Threaded binary trees, Heap, Applications of heap.

UNIT IV Non Linear Data Structures- Graphs

Part-A : Definition , Representation of Graph , Types of graphs, Graph Traversal Algorithms, Breadth first traversal, Depth first traversal , shortest Path Algorithms, Minimum Spanning Trees, Kruskal‘s Algorithm, Prim‘s Algorithm, Dijkstra‘s algorithm, Warshall‘s Algorithm, Applications of graphs.

UNIT V Sorting and Hashing

Bubble sort, Selection sort, Insertion sort, Shell sort, Radix sort, Merge sort, Quick sort, Heap Sort, Hashing and Hashing functions.

TEXT BOOKS:

1. Mark Allen Weiss, –Data Structures and Algorithm Analysis in C‖, 2nd Edition, Pearson Education.
2. Reema Thareja, –Data Structures Using C‖, Second Edition , Oxford University Press

REFERENCES:

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

18EC2L07: Applied chemistry laboratory

Scheme and Credits: L:0 T:0 P:3 C:1.5

Prerequisites: -

List of Experiments

S. No	Name of the Experiment
1	Introduction to chemistry laboratory
2	Determination of HCl using standard Na_2CO_3 solutions
3	Determination of alkalinity of a sample containing Na2CO3 and NaOH.
4	Determination of temporary and permanent hardness of water using standard EDTA solution.
5	Determination of Copper using standard EDTA solution
6	Determination of ferrous iron using standard $K_2Cr_2O_7$ solution
7	Determination of $KMnO_4$ using standard Oxalic acid solution
8	Determination of pH of the given sample solution using pH meter
9	Conductometric Titrations between strong acid and strong base
10	Potentiometric Titrations between strong acid and strong base
11	Synthesis of Phenol-Formaldehyde resin
12	Synthesis of Urea-Formaldehyde resin
13	Determination of Surface tension of a liquid
14	Determination of Viscosity of a liquid
15	Determination of Flash and Fire point of a lubricant
16	Determination of Cloud and Pour point of a lubricant
17	Determination of Aniline point of a lubricant

18EC2L08: Basic Electronics & Electrical Engineering Lab

Scheme and Credits: L:0 T:0 P:4

C:2 Prerequisites: -

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

COURSE OBJECTIVES:

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

COURSE 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, amplifiers etc.,

Electronic Workshop Practice:

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

List of Experiments: (All Experiments has to be performed)

1. CRO Operation and its Measurements
2. **Characteristics of Semiconductor Diode and Zener Diode:** Determination of forward and reverse resistance from VI characteristics.

3. **Static Characteristics of BJT under CE Mode:** Transistor Biasing **Determination** of h-parameters hie, hre from input characteristics and hfe & hoe from output characteristics.
4. **Static Characteristics of JFET:** Determination of rd from drain characteristics and gm from mutual characteristics and hence obtain μ.
5. **Characteristics of UJT and SCR:** Determination of intrinsic standoff ratio from emitter characteristics.
6. **Resonant Circuits:** Characteristics of Series and Parallel Circuits, Determination of quality factor and bandwidth.
7. **Bridge Rectifier with and without C-Filter:** Display of output waveforms and Determination of ripple factor, efficiency and regulation for different values of load current.
8. **Diode Clipping Circuits:** Design and display the transfer characteristics of single ended series, shunt type and double ended shunt type clipping circuits.
9. **Study of Electrical Devices**
10. **Experiment on working principle of Transformers**
11. **Experiment on working Principle of Motors**

18EC2L09: Data Structures Using C Lab

Scheme and Credits: L:0 T:0 P:3

C:1.5 Prerequisites: C

Programming

List of Experiments:

1. Write a program for performing operations on Single linked list
2. Write a program for performing operations on double linked list
3. Write a program for performing adding two polynomials
4. Write a program for implementing stacks using arrays
5. Write a program for implementing stacks using linked list
6. Write a program for implementing queues using arrays and linked list
7. Write a program for converting an infix expression to postfix expression
8. Write a program for binary tree traversals
9. Write a program for implementing operations on BST
10. Write a program for graph traversal algorithms
11. Write a program for implementing prims algorithm
12. Write a program for implementing kruskals algorithm
13. Write a program for implementing

a. Merge sort

b. Heap sort

c. Quick sort

SEMESTER-III

SYLLABUS

III SEMESTER	L	T	P	C
	3	1	0	4

18EC3T01-PROBABILITY THEORY AND STOCHASTIC PROCESSES

Course Objectives:

- To give students an introduction to elementary probability theory, in preparation for courses on statistical analysis, random variables.
- To mathematically model the random phenomena with the help of probability density concepts.
- To perform the operations on random variables.
- To analyze the concepts on random process and noise sources.
- To characterize spectral distribution and linear system with random inputs.

Course Outcomes:

- Upon completion of the subject, students will be able to compute:
- Define sample space and probability
- Understand the concept of random variable ,distribution and density functions
- Operations on Single and Multiple Random Variables
- Evaluate the temporal characteristics of random process
- Analyze the spectral characteristics and response of linear system for random input.

Syllabus

UNIT-I:

Probability and Random Variable:

Overview of Probability Theory: Sets, sample space and events, Axioms of Probability, Baye‘s Rule and Applications. Random Variables: Types, Distribution and Density of Random Variables and Properties, Conditional distribution and densities, Properties.

UNIT -II:

Distribution & Density Functions

Distribution and Density function of sum of two Independent Random variables. Some Special Random variables: Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Transformation of random variables.

UNIT-III:

Operations on Single and Multiple Random Variables

Moments of Random Variable, Joint Moments, Marginal distribution and density functions. Characteristic Function, Moment Generating Function, central limit theorem.

UNIT-IV:

Random Processes

Concept and classification of Random Process, Concept of Stationary Random Process, Wide Sense Stationary, Time Averages, Ergodicity, Auto Correlation, Cross Correlation, Covariance and properties, Modeling of Noise Sources, Effective Noise Temperature and Noise Figure.

UNIT-V:

Spectral Characteristics of Random Process

Power Spectrum-Properties, Relation between PSD and Autocorrelation function of a Random Process, Cross spectral Density and its relation with Cross Correlation function, Linear Systems with Random Inputs, System Responses and Statistics.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4Ed. 2001.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. Unnikrishna Pillai, PMI, 4 Ed., 2002.

REFERENCE BOOKS:

1. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, 3 Ed., PE 2002
2. Probability Methods of Signal and System Analysis - George R. Cooper, Clave D. MC Gillem, 3 Ed., 1999, Oxford.

III SEMESTER	L	T	P	C
	3	0	0	3

18EC3T02-ELECTRONIC CIRCUIT ANALYSIS

Objectives:

The main objectives of this course are:

- Small signal low and high frequency BJT transistor amplifier models and the expressions for the respective parameters are derived.
- Cascading of single stage amplifiers is discussed. Expressions for overall voltage gain are derived.
- The concept of feedback is introduced. Effect of negative feedback on amplifier characteristics is explained and necessary equations are derived.
- Basic principle of oscillator circuits is explained and different oscillator circuits are given with their analysis.
- Power amplifiers Class A, Class B, Class C, Class AB and other types of amplifiers are analyzed.

Outcomes:

At the end of this course the student can able to:

- Design and analyze the small signal low and high frequency transistor amplifier using BJT
- Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
- Identify and analyze the different feedback topologies.
- Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
- Know the classification of the power amplifiers and their analysis with performance comparison.

Syllabus:

UNIT-I

Small Signal Transistor Amplifier models:

Low Frequency Transistor Amplifier Models: Two port network, Transistor hybrid model, determination of h-parameters, generalized analysis of transistor amplifier model using h-parameters

High Frequency Transistor Amplifier models: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductances, Hybrid π capacitances, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

UNIT-II

Multistage Amplifiers : Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

UNIT -III

Feedback Amplifiers : Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

UNIT-IV

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators with BJT and FET and their analysis, Frequency and amplitude stability of oscillators.

UNIT-V

Power Amplifiers: Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions,Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Distortion in amplifiers.

Text Books:

1. Integrated Electronics- J. Millman and C.C. Halkias, Tata Mc Graw-Hill, 2009.
2. Electronic Devices and Circuits- Salivahanan, N.Suressh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition

References:

1. Electronic Circuit Analysis and Design – Donald A. Neaman, Mc Graw Hill.
2. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.

III SEMESTER	L	T	P	C
	3	0	0	3

18EC3T03-DIGITAL ELECTRONICS

Course Objectives:

The primary objective of this course is:

- To represent numbers and conversion between different representations.
- To analyze logic processes and implement logical operations.
- To develop the combinational logic circuits.
- To design and analyze the concepts of sequential circuits.
- To understand concept of programmable logic devices like PROM, PLA, PAL.

Course Outcomes

Upon completion of the course student will be able to:

- Understand different number systems and their conversions.
- Analyze the logical operations and Boolean algebra
- Develop combinational circuits and perform logical operations.
- Design the sequential logic functions.
- Know finite state machines and different programmable logic devices.

Syllabus:

UNIT I

Number Systems:

Binary- Octal- Decimal- Hexadecimal Number Systems- Conversion of Numbers from One Radix to Another Radix- r‘s Complement- (r-1)‘s Complement- Subtraction of Unsigned Numbers- Problems- Signed Binary Numbers- Weighted and Non weighted codes.

UNIT II

Logic Gates and Boolean Algebra:

Basic Gates- Universal Gates- Ex-Or and Ex-Nor Gates- SOP- POS- Boolean Theorems- Dual of Logical Expressions- Minimizations of Logic Functions Using Boolean Theorems- K Map Method- Minimization of Boolean Functions.

UNIT III

Combinational Logic Circuits:

Design of Half Adder- Full Adder- Half Subtractor- Full Subtractor- Ripple Adder, Carry Look Ahead adder and Subtractors- Design of Decoders- Encoders- Multiplexers- Demultiplexers- Priority Encoder- Code Converters- Magnitude Comparator. Cascading of Decoders & Multiplexers

Introduction to Programmable Logic Devices (PLDs):
PLA- PAL- PROM- Realization of Switching Functions Using PROM- Comparison of PLA, PAL and PROM.

UNIT IV
Introduction to Sequential Logic Circuits:
Basic Sequential Logic Circuits- Latch and Flip-Flop- RS- Latch Using NAND and NOR Gates- RS, JK, T and D Flip Flops- Conversion of Flip Flops- Flip Flops With Asynchronous Inputs (Preset and Clear).
Registers and Counters:
Design of Registers- Control Buffer Registers- Bidirectional Shift Registers- Universal Shift Register- Design of Ripple Counters- Synchronous Counters and Variable Modulus Counters- Ring Counter- Johnson Counter .

UNIT V
Finite state machine:
Analysis of clocked sequential circuits- state diagrams- state tables- design procedures- Realization of circuits using various flip-flops- ASM- Meelay to Moore conversion and vice-versa.

TEXT BOOKS
1. Digital Design , M.Morris Mano, Michael D Ciletti, 4th Edition,PEA,2003
2. Fundamentals of Logic Design, Roth, 5th Edition,Cengage 2004

REFERENCE BOOKS
1. Switching and Finite Automata Theory,Kohavi, 3rd Edition, Jha, Cambridge 2005
2. Digital Logic Design, Leach, Malvino, Saha, TMH,2000

III SEMESTER	L	T	P	C
	3	0	0	3

18EC3T04-NETWORK THEORY

COURSE OBJECTIVES:

The primary objective of this course is:

- To understand the basic concepts on RLC circuits.
- To know the behavior of the steady states and transients states in RLC circuits.
- To know the basic Laplace transforms techniques in periods‘ waveforms.
- To understand the two port network parameters.
- To understand the properties of LC networks and filters.

COUSE OUTCOMES:

Upon completion of the course student will be able to:

- Gain the knowledge on basic network elements and graph theory.
- Understand Network Theorems and applications
- Analyze Coupled circuits and Resonance.
- Will analyze the RLC circuit‘s behavior in detailed.
- Gain the knowledge in characteristics of two port network parameters

Syllabus:

UNIT – I

Introduction to Electrical Circuits: Network Elements- Sources- Sources Conversions- Kirchhoff‘s laws- RMS value, Average value, Form factor and peak factor- Phasor representation. **Graph Theory:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule.

UNIT – II

Network Theorems: Thevinin‘s, Norton‘s, Milliman‘s, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens and Duality.

UNIT – III

Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, Natural current, conductively coupled equivalent circuits- **Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, current in anti resonance, anti resonance at all frequencies.

UNIT – IV

Time and Frequency Domain Analysis of Electrical Circuits : Time domain analysis of R-L R-C and RL-C circuits, initial and final conditions of Network elements, steady state and transient response, Analysis of electrical circuits using Laplace Transform, steady state analysis using phasors, solutions of network equations using Laplace Transform, frequency domain analysis of RL-C circuit.

UNIT – V

Two-port networks : Relationship of two port networks, Z-parameters, Yparameters Transmission line parameters, h-parameters, Inverse h parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks.

TEXT BOOKS:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning,2nd Edition,2005

REFERENCES:

1. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.2002
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.

III SEMESTER	L	T	P	C
	3	0	0	3

18EC3T05-SIGNALS & SYSTEMS

COURSE OBJECTIVES:

The main objectives of this course are given below:

- To introduce the terminology of signals and systems.
- To introduce Fourier tools through the analogy between vectors and signals.
- To introduce the concept of sampling and reconstruction of signals.
- To analyze the linear systems in time and frequency domains.
- To study z-transform as mathematical tool to analyze discrete-time signals and systems.

COURSE OUTCOMES:

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

- Characterize the signals and systems and principles of vector spaces, Concept of Orthogonality.
- Analyze the Fourier series, Fourier transform and Laplace transform.
- Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- Understand the relationships among the various representations of LTI systems
- Apply z-transform to analyze discrete-time signals and systems.

Syllabus:

UNIT- I

INTRODUCTION: Definition of Signals and Systems, Elementary signals, Operations on signals, classification and characteristics of Signals, Analogy between vectors and signals, and Orthogonality concepts.

FOURIER SERIES: Fourier series representation of continuous time periodic signals, properties of Fourier series.

UNIT –II

FOURIER TRANSFORM: Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms and Hilbert Transform.

LAPLACE TRANSFORMS: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept ROC for Laplace transforms, constraints on ROC Properties of L.T‘s, Relation between L.T‘s, and F.T. of a signal.

UNIT-III

ANALYSIS OF LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Concept of convolution in time domain and frequency domain, Transfer function of a LTI system, Distortion less transmission through a system, Ideal LPF, HPF and BPF characteristics, Causality and Poly- Wiener criterion for physical realization

UNIT –IV

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 and Band Pass sampling.

UNIT–V

Z–TRANSFORMS: Difference between continuous-time and discrete-time, Concept of Z- Transform of sequence. Distinction between Laplace, Fourier and Z transforms. ROC in Z-Transform, constraints on ROC, Inverse Z-transform and properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.2002

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.2002
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015

III- SEMESTER	L	T	P	C
	3	0	0	3

18EC3T06-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES:

The main objectives of this course are given below:

- To understand the concept of Managerial Economic s and Demand forecasting
- To analyze the concept of Production function, Input Output relationship and different Cost Concepts.
- To know the different forms of Business organization and their Merits and Demerits
- To evaluate the different Accounting Systems preparation of Financial Statements for performance.
- To know Essence of Capitalization, Capital Budgeting and using different methods.

COURSE OUTCOMES:

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

- The estimate the Demand for a product and the relationship between Price and Demand.
- Analyze the Cost Concepts and to estimate the least cost combination of inputs.
- One should equipped with the knowledge of different Business Units
- To prepare Financial Statements and the usage of various Accounting tools.
- The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

Syllabus

UNIT – I:

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects- Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement- Demand forecasting and its Methods.

UNIT – II:

Production and Cost Analyses:

Production function-Isoquants and Isocosts-Law of Variable proportions- Cobb-Douglas Production function-Economics of Sale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs

Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis- Determination of Break-Even Point (Simple Problem).

UNIT – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

UNIT – IV:

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

UNIT – V:

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements- Analysis and Interpretation of Financial Statements

Capital Budgeting: Meaning of Capital Budgeting-Need for Capital Budgeting- Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXT BOOKS:

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: _Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011.
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.
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REFERENCES:

1. Suma Damodaran : Managerial Economics, Oxford 2011.
2. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.

III SEMESTER	L	T	P	C
	0	0	3	1.5

18EC3L07-ELECTRONIC CIRCUIT ANALYSIS LAB

COURSE OUTCOMES:

At the end of this course the student can able to:

- Understand how the amplification under small signal models.
- Analyzing frequency response of amplifiers.
- Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
- Utilize the Concepts of negative feedback to improve and importance of multivibrators.
- Understand the concepts of sampling gates.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Evaluation of h-parameters of BJT
2. Darlington Amplifier
3. Power Amplifiers Analysis & Efficiency
4. RC Coupled Single-stage BJT Amplifier: Determination of lower and upper cutoff frequencies, mid band voltage gain, gain bandwidth product from the frequency response and Determination of input and output impedances at mid frequency range.
5. Emitter Follower: Determination of mid band voltage gain, input and output impedances at mid frequency range.
6. Class-B Complementary Symmetry Power Amplifier: Display of input and output waveforms and Determination of the conversion efficiency and optimum load.
7. 7 voltage series and current shunt feedback amplifiers
8. BJT Colpitt‘s Oscillator: Design and test the performance for a given frequency.
9. BJT RC Phase Shift Oscillator: Design and test the performance for a given frequency
10. Design of Bistable Multivibrator
11. Design of Monostable Multivibrator
12. Design of Astable Multivibrator

ELECTRONIC CIRCUIT ANALYSIS LAB

Equipment required:

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

III- SEMESTER	L	T	P	C
	0	0	3	1.5

18EC3L08-SIGNALS AND SYSTEMS LAB

COURSE OUTCOMES:

After studying this course the students would gain enough knowledge

- Have a thorough understanding of the fundamental concepts and techniques used
- To understand and examine the signals and its operations.
- The ability to understand and analyze sampling process.
- Ability to identify basic requirements for a transformation techniques in continuous and discrete time

LIST OF EXPERIMENTS

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
3. Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.
4. Finding the even and odd parts of signal/ sequence and real and imaginary parts of signal.
5. Convolution between signals and sequences.
6. Autocorrelation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continuous/discrete system.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace Transform.
12. Locating the zeros and poles and plotting the pole-zero maps in S plane and Z-plane for the given transfer function.
13. Generation of Gaussian noise (real and complex), computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling theorem verification.
15. Removal of noise by autocorrelation / cross correlation.
16. Extraction of periodic signal masked by noise using correlation.
17. Verification of Winer-Khinchine relations.

18. Checking a random process for stationarity in wide sense.

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Equipment & Software required:

Software:

i. Computer Systems with latest specifications
ii. Connected in Lan (Optional)
iii. Operating system (Windows XP)
iv. Simulations software (Simulink & MATLAB signal Processing Toolbox)

III SEMESTER	L	T	P	C
	2	0	0	0

18EC3T09-Constitution of India

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative.

Course Outcomes:

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government i.e, Executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

UNIT-I

Introduction to Indian Constitution: Constitution‘ meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

LEARNING OUTCOMES:

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zilla Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Block level Organizational Hierarchy-(Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zilla panchayat block level organisation

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

LEARNING OUTCOMES: - After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/101104065/
2. www.hss.iitb.ac.in/en/lecture-details
3. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

SEMESTER-IV

SYLLABUS

IV SEMESTER	L	T	P	C
	3	0	0	3

18EC4T02-Humanities-1 (Effective Technical Communication)

UNIT I Vocabulary Building

The concept of word formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives
Synonyms, antonyms and standard abbreviations

UNIT II Writing Skills

Sentence structures
Use of phrases and clauses in sentences
Importance of proper punctuation
Creating coherence
Organizing principles of paragraphs in documents
Comprehension
Essay writing

UNIT III Identifying Common Errors in Writing

Subject-verb agreement
Noun-Pronoun agreement
Misplaced Modifiers
Articles
Prepositions
Redundancies
Clichés

UNIT IV Oral Communication

Common Everyday situations: Conversations and Dialogues
Communication at workplace
Interviews
Formal Presentations

UNIT V Life Skills

Self-assessment and self esteem
Attitudes, values and beliefs
Personal goal setting
Career planning
Managing Time
Complex Problem solving
Creativity

Suggested Readings:

1. Practical English usage, Michael Swan, OUP 1995
2. Remedial English Grammar, F.T.Wood.Macmillan, 2007
3. On writing well. William Zinsser, Harper Resource book, 2001
4. Study Writing, Liz-Hamp-Lyons and Ben Heasly, Cambridge University Press, 2006
5. Communication Skills, Sanjay Kumar and Pushp Latha, Oxford University press, 2011
6. Exercises in spoken English parts I-III, CIEFL, Hyderabad Oxford university press

IV SEMESTER	L	T	P	C
	2	0	0	2

18EC4T02-Physics of Materials

UNIT I

CRYSTAL STRUCTURES :

Crystalline & Non-crystalline states; Geometry of crystals-Space Lattices; Bravais Lattice-SC, BCC & FCC lattices; Crystal Structure, Directions & Planes; Miller Indices; Structure determination by X-ray diffraction; Bragg's law.

UNIT II

CRYSTAL IMPERFECTIONS :

Crystal Imperfections-Point imperfections; Enthalpy; Gibbs Free Energy; Geometry of Dislocation; Other Properties of Dislocation; Surface Imperfections.

UNIT III

CONDUCTIVITY OF MATERIALS:

Conductivity of Metals; Introduction; Resistivity and Factors Affecting Resistivity of conducting materials; The Electron Gas Model of Metal; Motion of Electron in Electric Field; Equation of Motion of An Electron; Current Carried by Electron; Mobility; Energy Levels of a Molecule; Fermi Energy; Fermi Dirac Distribution; Contact Potential; Effect of Temperature on Electrical Conductivity of Metals.

UNIT IV

ULTRASONICS

Intoduction-Properties- Production – Ultrasonic transducers – Non Destructive Testing (NDT) – Pulse Echo Technique - Applications.

UNIT V

PHYSICAL OPTICS

INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings- Determination of wavelength of light.
DIFFRACTION: Fraunhofer diffraction at single slit- double slit (Qualitative treatment only), N-slits – Diffraction Grating.

Text Books:

1. Materials Science and Engineering – A First Course by V. Raghavan, Fifth Edition, Thirty-ninth Print, June 2010 Edition, Prentice-Hall Of India Pvt Ltd.
2. II. Introduction to Electrical Engineering Materials, C.S. Indulkar and S. Thiruvengadam, 6th Edition, Reprint 2012, S. Chand and Company Ltd.

Reference Books:

1. Electronic Engineering Materials and Devices, John Allison, Tata McGraw Hill, New Delhi. 2000
2. Elements of Materials Science and Engineering, Lawrence H. Van Vlack, Pearson Education 6th Edition 2004

IV SEMESTER	L	T	P	C
	3	0	0	3

18EC4T03-ANALOG IC APPLICATIONS

Course Objectives:

The student will be made

- To learn the working of logic families
- To understand the functioning of different types of Time-base Generators.
- To understand the analysis & design of different types of active filters using op-amps
- To learn the internal structure, operation and applications of different analog ICs
- To Acquire Knowledge of A/D and D/A Converter

Course Outcomes

After going through this course the student will be able to

1. Understand about Logic Families with Diode-Transistor
2. Design different Time base generators.
3. Design circuits using operational Amplifier for various applications
4. Understand the concept of A/D & D/A Converters
5. Analyze and design amplifiers and active filters using Op-amp.

Syllabus:

.**UNIT I**

LOGIC FAMILIES Diode Logic, Transistor Logic, Diode-Transistor Logic, Transistor-Transistor Logic, Emitter Coupled Logic, AOI Logic and Comparison of Logic Families.

UNIT II

TIME BASE GENERATORS:

General features of a time base signal, Methods of generating time base waveform- Exponential Sweep Circuits, Negative Resistance Switches, Miller and Bootstrap time base generators.

UNIT III

OPERATIONAL AMPLIFIER

Classification; IC Chip Size and Circuit Complexity; the Ideal Operational Amplifier; Operational Amplifier Internal Circuit. Op-Amp parameters & Measurement, DC Characteristics; AC Characteristics and Compensation Techniques.

UNIT-IV

OPERATIONAL AMPLIFIER APPLICATIONS

Basic Op-Amp Applications; Inverting and Non-inverting amplifier, input & output off set voltages & currents, slew rate, CMRR, PSRR, drift. Integrator and differentiator, Difference amplifier, Instrumentation Amplifier; AC Amplifier; V to I and I to V Converters. Op-Amp Circuits using Diodes; Sample and Hold Circuit; Operational transconductance Amplifier (OTA). Comparator; Regenerative Comparator.

D-A AND A-D CONVERTERS

Introduction; Series Op-Amp Regulator; Basic DAC Techniques Weighted Resistor DAC,R-2R DAC ; A-D Converters, Flash ADC and Successive approximation Converter.

UNIT V

FILTERS USING OP-AMP & 555 TIMERS

Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters Description of Functional Diagram of 555 Timer; Monostable Operation; Astable Operation and its Applications and PLL, Applications PLL. VCO and its applications.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill,4th Edition,2005
2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition,2003.

REFERENCES:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, Mothiki S Prakash Rao McGraw-Hill,Second Edition, 2007.
2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.

IV SEMESTER	L	T	P	C
	3	0	0	3

18EC4T04-DIGITAL SYSTEM DESIGN USING HDL

COURSE OBJECTIVES:

The student will be introduced to

- In this course, students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.
- Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.
- Understand the concepts of Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL.

COURSE OUTCOMES:

After going through this course the student will be able to

1. Understand the concepts of Design Flow and Programming Statements
2. Understand the concepts of Combinational logic circuits in digital system
3. Understand the concepts of sequential logic circuits in digital system
4. Understand the concepts of Programmable logic devices & memories.
5. Understand the concepts of HDL modeling and logic families

Syllabus

UNIT-I

Digital Design Using HDL: Design flow, program structure, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

UNIT-II

Combinational Logic Design: Adders & Subtractors, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder.

UNIT-III

Sequential Logic Design: Flip-Flops, Counters, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Register. Linear feedback shift register and applications.

UNIT-IV

Programmable Logic Devices (PLDs) & Memories: PROM, PLA, PALD, ROM: Internal structure, 2D-Decoding, timing and applications, Static RAM and Dynamic RAM: Internal structure, timing, standard, synchronous.

UNIT-V

VHDL Modelling and Digital Logic Families: Simulation, Logic Synthesis, Technology Libraries, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach. Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition, 2004

REFERENCES:

1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic, Tata McGraw Hill, 2nd edition.2004
2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

IV SEMESTER	L	T	P	C
	3	0	0	3

18EC4T05-ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES

COURSE OBJECTIVES:

The students will be introduced to

- Vector algebra coordinate systems
- Electrostatics and magnetostatics principles.
- Maxwell Equations in time varying fields.
- Electromagnetic wave and propagation characteristics.
- Transmission lines characteristics and different loading concepts.

COURSE OUTCOMES:

Up on completion of this course students will be able to

1. Know the basic principles of electrostatics
2. Understand the primary laws in magneto statics and its importance
3. Gain knowledge on functionalities of time varying fields
4. Determine the parameters in EM Wave propagating conditions
5. Derive and determine the conditions and constants in transmission lines

Syllabus:

UNIT I

Electrostatics: Coulomb‘s Law, Gauss Law and Applications, Electric Potential, Maxwell‘s Two Equations for Electrostatic Fields, Energy Density, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson‘s and Laplace‘s Equations; Capacitances.

UNIT-II

Magneto Statics : Biot-Savart Law, Ampere‘s Circuital Law and Applications, Magnetic Flux Density, Maxwell‘s Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere‘s Force Law, Inductances

UNIT III

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms, Boundary Conditions.

UNIT IV

EM Wave Characteristics: Wave Equations, Uniform Plane Waves – Relations between E & H. Wave Propagation in Lossless and Conducting Media, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, Brewster Angle, Critical Angle and Poynting Theorem.

UNIT V

Transmission Lines -: Transmission Line Equations, Primary & Secondary Constants, Phase and Group Velocities, Condition for Distortion less and Minimum Attenuation, Loading - Types of Loading. Reflection Coefficient, VSWR. λ/4, λ /2, λ/8 Lines Smith Chart, Stub Matching.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

REFERENCES:

1.Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2.Engineering Electromagnetics – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.

IV-SEMESTER	L	T	P	C
	3	0	0	3

18EC4T06-CONTROL SYSTEMS

COURSE OBJECTIVES

The student will

- Learn the fundamental concepts of Control systems and mathematical modelling of the system.
- Study the concepts of time response and frequency response of the system.
- Understand the basics of stability analysis of the system.
- Learn Design Principles of Different Controllers
- Know the Concept of State Variable Models

COURSE OUTCOMES

After going through this course the student will be able to

1. Represent the mathematical model of a system.
2. Determine the response of different order systems for various inputs in time domains
3. Analyze the stability of the system using RH and RL
4. Know the Frequency Response Using Different Graphical Networks
5. Design Controllers for Different Applications.

Syllabus:

UNIT I

INTRODUCTION: Concepts of Control Systems- Open Loop and closed loop control systems and examples, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II

TRANSFER FUNCTION REPRESENTATION: Transfer Function of DC Servo motor - AC Servo motor-, Block diagram representation of systems -Block diagram algebra – Representation by Signal flow graph - Reduction using mason‘s gain formula. Conversion from Block diagram to signal flow graph & vice versa

UNIT III

TIME RESPONSE ANALYSIS: Time response of first order systems and second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative and proportional integral systems.

STABILITY ANALYSIS IN S-DOMAIN: The concept of stability – Routh's stability criterion The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV

FREQUENCY RESPONSE ANALYSIS: Frequency domain specifications-Bode diagrams-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Plots and Stability Analysis **UNIT V**

CLASSICAL CONTROL DESIGN TECHNIQUES: Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. Concepts of state, state variables and state model, derivation of state models from block diagrams, State Transition Matrix and its Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Automatic Control Systems– by B. C. Kuo– John wiley and son's. 8th edition, 2003.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.2002

REFERENCE BOOKS:

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd.,3rd ed,.2000
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers

IV SEMESTER	L	T	P	C
	0	0	3	1.5

18EC4L07- ANALOG IC APPLICATIONS LAB.

Course Outcomes

After going through this course the student will be able to

- Understand about Logic Families with Diode-Transistor
- Design different Time base generators.
- Design circuits using operational Amplifier for various applications
- Analyze and design amplifiers and active filters using Op-amp.
- Understand the concept of A/D & D/A Converters

Minimum Twelve Experiments to be conducted:
The Following List of Experiments Will be performed

1. Study of Logic families using Diodes and Transistors.
2. Bootstrap sweep circuit.
3. Active Filter Applications – LPF, HPF (first order)
4. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
5. Study of Basic Op-Amp Circuits: Design and verification of inverting amplifier, non-inverting amplifier, voltage follower, integrator, differentiator and inverting adder circuits.
6. Op-Amp Schmitt Trigger: Design, testing, and display of waveforms.
7. Op-Amp RC Phase-Shift Oscillator: Design and test the performance for the given frequency.
8. Op-Amp Wein Bridge Oscillator: Design and test the performance for the given frequency.
9. Study of 555 Timer: Design and test the performance of Monostable multivibrator circuit for a given pulse width.
10. Study of 555 Timer: Design and test the performance of Astable multivibrator circuit for a given frequency.
11. Study of Voltage Regulator: Design and study of IC7805 voltage regulator, calculation of line and load regulation.
12. A/D Converter

Equipment required for Laboratory:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multi Meters
6. IC Trainer Kits (Optional)
7. Bread Boards
8. Components: - IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
9. Analog IC Tester

IV-SEMESTER	L	T	P	C
	0	0	3	1.5

18EC4L08-DIGITAL SYSTEMS DESIGN USING HDL LAB

The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. Further, it is required to verify the logic with necessary hardware.

COURSE OUTCOMES:

After going through this course the student will be able to

- Understand the concepts of Design Flow and Programming Statements
- Understand the concepts of Combinational logic circuits in digital system
- Understand the concepts of sequential logic circuits in digital system
- Understand the concepts of Programmable logic devices & memories.
- Understand the concepts of HDL modeling and logic families

List of Experiments:

1. Realization of Logic Gates
2. 3 to 8 Decoder
3. 8*1 Multiplexer and 2*1 De-multiplexer
4. 4-Bit Comparator.
5. D Flip-Flop
6. Decade Counter
7. 4 Bit Counter
8. Shift Register
9. Universal shift register
10. Ram (16*4) (read and write operations)
11. ALU

Equipment Required:

1. Xilinix ISE software-latest version
2. Personal computer with necessary pheripherals
3. Hardware kits- Various FPGA families.

IV SEMESTER	L	T	P	C
	0	0	4	2

18EC4L09-MINI PROJECT

The students are required to design and develop prototype model relevant to the Electronics and Communication. The prototype should be done by individual student. The model should be innovative in development; student should give presentation and demonstration of project work. The students are required to submit document of project report at the end.

COURSE OUTCOMES:

After going through this course the student will be able to

- Understand the real world problems
- Gain knowledge to solve and address the problem
- Improve presentation skills and writing skills
- Involve in both theoretical and practical work

The evaluation of mini project is done based on

1)Relevance of the project
2)Complexity of project work
3)New idea involved in the project
4)Current age Acceptance of the Project
5)Design and Development of project work
6)Presentation and Communication skill of student
7)Project Report given by the Student

SEMESTER-V

SYLLABUS

B. Tech V Semester	**L**	**T**	**P**	**C**
	3	0	0	3

18EC5T01 - Analog and Digital Communication

Course Objectives: Students undergoing this course, are expected to
1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Distinguish the figure of merits of various analog modulation methods
4. Familiarize with the fundamentals of digital communication systems
5. Familiarize with various techniques for digital modulation and demodulation of signals

Course Outcomes: After undergoing the course, students will be able to
1. Differentiate various Analog modulation schemes
2. Analyze demodulation schemes and their spectral characteristics
3. Analyze noise characteristics of various analog modulation methods
4. Differentiate various Digital modulation schemes
5. Analyze demodulation schemes and their spectral characteristics

UNIT I: AMPLITUDE MODULATION

Introduction to communication system, need for modulation, , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Detection of AM Waves;, Envelope detector, SNR Calculations of AM waves.

UNIT II: DSB & SSB MODULATION

DSB SC (Double side band suppressed carrier) modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Coherent detection of DSB-SC Modulated waves, SNR Calculations of DSB SC.

SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves. SNR of SSB.

UNIT III: ANGLE MODULATION

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, zero crossing detector, Phase locked loop, SNR Caluculations.

UNIT IV: PULSE DIGITAL MODULATION

Elements of digital communication systems, advantages of digital communication systems, Elements of PCM, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT V: DIGITAL MODULATION TECHNIQUES

Introduction, ASK, FSK, PSK, DPSK, QPSK Transmitter and receivers Probability of error calculations.

TEXT BOOKS:

1. Principles of Communication Systems – H Taub& D. Schilling, GautamSahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

REFERENCES:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.,.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

B. Tech V Semester	L	T	P	C
	3	0	0	3

18EC5T02- MICROPROCESSOR AND MICROCONTROLLER

COURSE OBJECTIVES:

1. To understand the basics of 8085 & 8086 microprocessors architectures and its functionalities.
2. To develop machine language programming in microprocessors.
3. To design and develop Microprocessor based interfacing for real time applications using low level language like ALP.
4. To understand the basics of microcontrollers architectures and its functionalities.
5. To design and develop microcontroller based interfacing for real time applications using low level language like ALP.

Course Outcomes:

1. To be able to understand the overview of 8085 & 8086 microprocessor in general.
2. To be able to understand the Assembly Language Programming in microprocessors.
3. To be able to understand Interfacing I/O devices through PPI with microprocessor.
4. To be able to understand the overview of microcontroller in general & ALP in microcontrollers.
5. To be able to understand the microcontroller interfacing with I/O devices using ALP.

UNIT-I: INTEL 8085 & 8086 MICROPROCESSOR ARCHITECTURE:

8085

Architecture of 8085, Main features, Address and Data bus, Pin Diagram, Register organization, Addressing Modes

8086

Main features, pin diagram/description, 8086 microprocessor family, 8086 internal architectures, bus interfacing unit, execution unit, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II: 8086 PROGRAMMING:

Addressing modes, Program development steps instruction set, assembler & directives, writing simple programs with an assembler, assembly language programs

UNIT-III: 8086 INTERFACING:

I/O INTERFACE: 8255 PPI, Various Modes of Operation and Interfacing to 8086, D/A and A/D Converter, Stepper motor, keyboard interfacing, LED, 7-segment display, Interfacing of DMA controller 8257

INTERFACING WITH ADVANCED DEVICES: Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine, architecture of 8279.

COMMUNICATION INTERFACE: Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

UNIT-IV: INTRODUCTION TO MICROCONTROLLERS:

Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing

Modes and Instruction set of 8051, Simple Programs, memory interfacing to 8051

UNIT -V

8051 REAL TIME CONTROL: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters, Interfacing: keyboard, displays (LED, 7-segment display unit), A/D and D/A converters.

Text Books:

1. Microprocessors and Interfacing – Programming and Hard ware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition.
2. The 8051 Microcontroller & Embedded Systems Using Assembly and C by Kenneth J.Ayala, DhananjayV.Gadre,CengageLearninbg , India Edition.Advanced Microprocessors and Peripherals KM Bhurchandi, AK Ray (3rd Edition)

Reference Books:

1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B.Brey, Pearson, Eighth Edition
2. Microprocessors and Microcontrollers by N.Senthil Kumar, M.Saravanan andS.Jeevananthan, Oxford University Press, Seventh Impression.

B. Tech V Semester	L	T	P	C
	3	0	0	3

18EC5T03-Digital Signal Processing

Course Objectives: Students undergoing this course, are expected to

1. Analyze the Discrete Time Signals and Systems
2. Know the importance of FFT algorithm for computation of Discrete Fourier Transform
3. Understand the various implementations of digital filter structures
4. Learn the FIR and IIR Filter design procedures
5. Know the need of Multirate Processing

Course Outcomes: After undergoing the course, students will be able to

1. Apply the difference equations concept in the analyzation of Discrete time systems
2. Use the FFT algorithm for solving the DFT of a given signal
3. Design a Digital filter (FIR&IIR) from the given specifications
4. Realize the FIR and IIR structures from the designed digital filter.
5. Use the Multirate processing concepts in various applications

UNIT 1:INTRODUCTION:

Introduction to Digital Signal Processing: Discrete time sequences, Classification of Discrete time signals and systems, stability of LTI systems, Response of LTI systems to arbitrary inputs, Review of Z-transforms, solution of difference equations using Z-transforms,System function.

UNIT II: DISCRETE FOURIER SERIES & FOURIER TRANSFORMS:

Introduction of discrete Fourier series,DFS representation of periodic sequences, Discrete Fourier transforms &it‘s Properties, Inverse FFT, Frequency domain representation of discrete time signals and systems.

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms for DFT calculation.

UNIT III: DESIGN OF IIR DIGITAL FILTERS& REALIZATIONS:

Basic structures of IIR systems-Direct form 1,Direct form 2, transposed and cascade structures, Analog to Digital frequency transformation techniques, Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from analog filters

UNIT IV:DESIGN OF FIR DIGITAL FILTERS & REALIZATIONS:

Basic structures of FIR systems- Direct form,cascade,Lattice and Lattice-ladder structuresCharacteristics of FIR Digital Filters, Design of FIR Digital Filters using Window Techniques- Rectangular and Hamming windows, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V: MULTIRATE DIGITAL SIGNAL PROCESSING:

Introduction, Decimation,Interpolation, Sampling rate conversion,Applications – Sub-band Coding of SpeechSignals, Implementation of Digital Filter Banks, Trans-multiplexers.

Text Books:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, DimitrisG.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI,2008

Reference Books:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill, 2006
2. Digital Signal Processing: MH Hayes, Schaum‘s Outlines, TATA Mc-Graw Hill, 2007.

B. Tech V Semester	L	T	P	C
	2	0	0	2

18EC5T04- INTELLECTUAL PROPERTY RIGHTS

Course Objective – The students will be enlightened with all the fundamental concepts of Intellectual Property Rights, disseminate knowledge on patents, trademarks and registration of copyrights.

Course Outcomes-

1. To introduce the various concepts relating to Intellectual Property Rights and Patents.
2. To impart knowledge on various aspects relating to laws relating to patents in India.
3. To indulge the process of registering for copyrights and trademarks.

Course Content-

UNIT I: Introduction to Intellectual Property Rights (IPR) - Concept of Property - Introduction· to IPR - International Instruments and IPR – WIPO –TRIPS – WTO – Laws relating to IPR – Agencies for IPR Registration - Use and Mis use of Intellectual property rights.

UNIT II: Patents - Introduction to Patents – Laws relating to Patents in India – Patent registration and Granting of Patent – Exclusive Rights – Limitations – Ownership and Transfer – Double Patenting.

UNIT III: **Copyrights and Trademarks –** Principles of Copyright Protection – Law relating to Copyrights - Copyright Ownership – Transfer and Duration – Infringement of Copyright

Introduction to Trademark – Laws relating to Trademark – Distinction between Trademark and Property Mark – Trade mark Registration and Maintenance

UNIT IV: **Trade Secrets-** Introduction to Trade Secrets – General Principles – Laws relating to Trade secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements.

UNIT V: Cyber Law and Cyber Crime – Introduction to Cyber law – Information Technology act 2000 – Protection of online and Computer Transactions – E-Commerce – Cyber Crimes – Prevention and punishment.

REFERENCE BOOKS

1. Deborah E.Bouchoux: ―Intellectual Property‖. Cengage learning, New Delhi
2. Kompal Bansal & Parishit Bansal ―Fundamentals of IPR for Engineers‖, BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western‘s Special Topics Collections
4. Prabhuddha Ganguli: _ Intellectual Property Rights‖ Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: ―Intellectual Property‖, Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: ―Intellectual Property Rights‖, Excel Books. New Delhi.
7. M. Ashok Kumar and Mohd. Iqbal Ali: ―Intellectual Property Right‖ Serials Pub.

B. Tech V Semester

L	T	P	C
3	0	0	3

18EC5T05-Quantitative Aptitude & Reasoning
(OPEN ELECTIVE-I)

Syllabus:

Unit-I: Divisibility and remainder rules of numbers, Unit digit , square root, cube root and simplification of numbers, HCF and LCM of numbers, Averages and Percentages Alphabetical and miscellaneous series, Coding and decoding and Blood Relations

Unit-II: Profit & loss, Simple interest and Compound interest Direction, Order and Ranking, Sitting arrangement and Puzzle

Unit-III: Ratio & proportions, Partnership, Alligation and mixtures and Ages. Data sufficiency, Inequalities and Decision making .

Unit-IV: Time and work, Pipes & cisterns and Time and distance . Syllogism, Statement and course of action and Statement and Assumption.

Unit-V: Boats and streams, Areas, Volume and surface areas. Statement and argument, Cause and effect and Drawing inference.

Text Books: 1. "Objective Arithmetic" by R.S. Agarwal, S. Chand Publications. 2. Verbal and non-verbal Reasoning, R.S. Agarwal, S. Chand Publications

Reference Books: 1.Quantitative Aptitude by Dinesh Khattar, Pearson Education. 2.Quantitative Aptitude by Abhjit Guha. 3.Fast Track objective Arithmetic, Rajesh Verma, Arihant publications.

B. Tech V Semester	L	T	P	C
	3	0	0	3

18EC5T06-SOLID STATE DEVICES AND CIRCUITS
(OPEN ELECTIVE-I)

Course Objectives: Students undergoing this course, are expected to
1. Familiarize with the fundamentals of Semiconductor physics
2. Familiarize with various diodes and characteristics.
3. Familiarize with the transistors and their configurations.
4. Disseminate Amplifications with transistors
5. Understand the operation and working of Oscillators

Course Outcomes: After undergoing the course, students will be able to
1. Understand importance of semiconductors.
2. Analyze Diodes characteristics.
3. Differentiate various configurations.
4. Design amplifiers at different applications using transistor.
5. Analyze different oscillators design.

Unit I: Basics Concepts of Semiconductor Physics
Charged Particles, Field Intensity, Potential, Energy, the eV unit of energy, Energy Band theory of Crystals, Insulators, Semiconductors and metals, Mobility and Conductivity, Electrons and Holes, Donor and Acceptor impurities, Charge Densities in a Semiconductor, Electrical properties of Ge and Si, Hall Effect, Diffusion and Drift Currents, Mass action Law, Fermi-Dirac distribution.

Unit II: Diodes
PN junction diode- Energy band diagram of PN junction Diode- V-I Characteristics –Currentcomponents in PN junction Diode- Diode equation- Diode resistance and capacitance Characteristics of Zener Diode, Varactor Diode- SCR and UJT.

Unit III: Transistors
Bipolar Junction Transistor: Transistor current components- Transistor equation- Transistor configurations- Characteristics of a transistor in CB,CC& CE configurations- Transistor as a Switch- Transistor as an amplifier.
Field Effect Transistors (FET): Junction Field Effect Transistor construction & operation- characteristics CS, CD & CG

Unit IV:Small Signal Transistor Amplifier models:
Low Frequency Transistor Amplifier Models: Two port network, Transistor hybrid model, determination of h- parameters, generalized analysis of transistor amplifier model using h-parameters

Unit V: Feedback Amplifiers and Oscillators
Negative Feedback: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers
Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and their analysis. Generalized analysis of LC Oscillators, Hartley and Colpitt‘s oscillators with BJT and their analysis.

Text Books:

1) Millman, Halkias, ―Integrated Electronics- Analog and Digital Circuits and Systems‖, TMH.
2).Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, Mothiki S Prakash Rao McGraw-Hill,Second Edition.

Reference Books:

1) Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.
2) . Basic Electronic Circuits -V.K.Mehta,S-chand Publications,2008.

B. Tech V Semester	L	T	P	C
	3	0	0	3

18EC5T07-PRINCIPLES OF COMMUNICATION
(OPEN ELECTIVE-I)

Course Objectives: Students undergoing this course, are expected to
1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Familiarize with the fundamentals of digital communication systems
4. Familiarize with various techniques for digital modulation and demodulation of signals
5. Distinguish the figure of merits of various analog modulation methods

Course Outcomes: After undergoing the course, students will be able to
1. Differentiate various Analog modulation schemes
2. Analyze demodulation schemes and their spectral characteristics
3. Differentiate various Digital modulation schemes
4. Analyze demodulation schemes and their spectral characteristics
5. Analyze noise characteristics of various analog modulation methods

UNIT I
Introduction: Overview of Communication system, Communication channels, Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Double sideband with Carrier (DSB-C), Double side band without Carrier DSB-SC, Single Side Band Modulation SSB, Modulators and Demodulators, Vestigial Side Band (VSB), Quadrature Amplitude Modulator, Radio Transmitter and Receiver

UNIT II
Angle Modulation, Frequency and Phase modulation, frequency deviation, Bandwidth, FM Modulators and Demodulators, Narrow band and wide band FM, FM Broadcasting.

UNIT III
Pulse digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse Position Modulation, Generation and Demodulation, PCM System Issues in digital transmission: Frequency Division Multiplexing Time Division Multiplexing

UNIT IV
Digital Representation of Analog Signals Pulse Code Modulation (PCM), Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Sources of Noises, Frequency domain representation of Noise, Super position of Noises, Linear filtering of Noises, Mathematical Representation of Noise.

UNIT V
Noise in Amplitude Modulation: Analysis, Signal to Noise Ratio, Figure of Merit. Noise in Frequency Modulation: Pre-emphasis, De-Emphasis and SNR Improvement, Phase Locked Loops Analog and Digital.

Text Book:
1. Herbert Taub and Donald L. Schilling, ―Principles of Communication Systems‖, Tata McGrawHill.
2. RishabhAnand, Communication Systems, Khanna

Reference Books:

1. B.P.Lathi,–ModernDigitalandAnalogcommunicationSystems‖,3rd Edition, Oxford University Press.
2. Simon Haykin, ―Communication Systems‖, 4th Edition, Wiley India.

B. Tech V Semester

L	T	P	C
0	0	3	1.5

18EC5L08-MICROCONTROLLER ANDMICROPROCESSORS LAB

PART- A:(Minimum of 5 Experiments has to be performed)
8086 Assembly Language Programming using Assembler Directives

1. Sorting.
2. Multibyte addition/subtraction
3. Sum of squares/cubes of a given n-numbers
4. Addition of n-BCD numbers
5. Factorial of given n-numbers
6. Multiplication and Division operations
7. Stack operations
8. BCD to Seven segment display codes

PART- B: (Minimum of 3 Experiments has to be performed) 8086 Interfacing

1. Hardware/Software Interrupt Application
2. A/D Interface through Intel 8255
3. D/A Interface through Intel 8255
4. Keyboard and Display Interface through Intel 8279
5. Generation of waveforms using Intel 8253/8254

PART- C: (Minimum of 3 Experiments has to be performed) 8051 Assembly Language Programs

1. Finding number of 1‘s and number of 0‘s in a given 8-bit number
2. Addition of even numbers from a given array
3. Ascending / Descending order
4. Average of n-numbers

PART-D: (Minimum of 3 Experiments has to be performed) 8051 Interfacing

1. Switches and LEDs
2. 7-Segment display (multiplexed)
3. Stepper Motor Interface
4. Traffic Light Controller

B. Tech V Semester	**L**	**T**	**P**	**C**
	0	0	3	1.5

18EC5L09-Digital Signal Processing Laboratory

List of Experiments

1. Generation of basic sequences like impulse,unit step, ramp. Sinusoidal, co-sinusoidal, exponentially growing and decaying sequences.
2. Verification of linear convolution.
3. Verification of circular convolution.
4. DFT of an N-point sequence
5. IDFT of an N-point sequence
6. Frequency response of IIR low pass and high pass Butterworth filters
7. Frequency response of IIR lowpass and high pass Chebyshev filters
8. Frequency response of FIR low pass filter using Rectangular and Hamming Windows
9. Decimation.
10. Interpolation

Software needed: MATLAB

B. Tech V Semester	L	T	P	C
	1	0	2	2

18EC5L10-Communication Systems Laboratory

List of Experiments

All the experiments should be performed in Hardware and software (MATLAB)

1. Amplitude modulation(AM)- Modulation and demodulation
2. DSB-SC Modulation and demodulation
3. SSB-SC Modulation and demodulation
4. Frequency Modulation and demodulation
5. PCM Modulation and demodulation
6. DPCM Modulation and demodulation
7. DM Modulation and demodulation
8. ASK Modulation and demodulation
9. FSK Modulation and demodulation
10. PSK Modulation and demodulation
11. Sampling theorem
12. Time division Multiplexing

Equipment required for Laboratories:

1. RPS – 0 – 30 V
2. CRO – 0 – 20 M Hz.
3. Function Generators – 0 – 1 M Hz
4. RF Generators – 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for analog and Digital Communication
7. Components

B. Tech V Semester	**L**	**T**	**P**	**C**
	3	0	0	0

18EC5N11-Essence of Indian Traditional Knowledge

Objectives:
To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

1. The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledge system
2. To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
3. The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection.
4. To know the student traditional knowledge in different sector.

Course Outcomes: After completion of the course, students will be able to:

1. understand the concept of Traditional knowledge and its importance
2. know the need and importance of protecting traditional knowledge
3. know the various enactments related to the protection of traditional knowledge.
4. understand the concepts of Intellectual property to protect the traditional knowledge

Unit-I:
Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Unit-II:
Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Unit-III:
Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

Unit-IV:
Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Unit-V:
Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Reference Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

E-Resources:

1. https://www.youtube.com/watch?v=LZP1StpYEPM 2.http://nptel.ac.in/courses/121106003/

SEMESTER-VI

SYLLABUS

B. Tech VI Semester	L	T	P	C
	3	0	0	3

18EC6T01 -VLSI DESIGN

COURSE OBJECTIVE:

1. To learn basic MOS and CMOS characteristics and Layout diagram
2. To learn static and dynamic CMOS design
3. To learn sequential logic circuits and design strategies
4. To learn the concepts of designing Low power VLSI Subsystems.
5. To learn the concepts of testing and implementation techniques

COURSE OUTCOME: After completion of the course student will be able to:

1. Model the behavior of a MOS Transistor
2. Design combinational and sequential circuits using CMOS gates
3. Design the low power circuits.
4. Implement design on FPGA.
5. Perform Testing and implementation techniques

UNIT I- INTRODUCTION

Evolution of IC technology, Comparison of IC and Discrete , IC fabrication Process, MOS Fabrication Process, CMOS fabrication Process.

MOS TRANSISTOR

Operation of NMOS and PMOS transistors, V-I characteristics of MOS, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, CMOS Voltage Transfer Characteristics, Scaling principles and fundamental limits, power consumption and effect of scaling on CMOS performance metrics, propagation delays, Latch up Susceptibility, Stick diagram, Layout diagrams .

UNIT II -COMBINATIONAL LOGIC CIRCUITS

Examples of Combinational Logic Design, Elmore‘s constant, Ratioed Logic, Pass transistor Logic, Dynamic logic, static and dynamic CMOS design, Speed and Power in dynamic logic, cascading dynamic gates, CMOS Transmission gates.

UNIT III- SEQUENTIAL LOGIC CIRCUITS

Static and Dynamic Latches and Registers, Timing issues : Synchronous timing basics, Classification, Skew, Jitter and their sources, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design.

UNIT IV DESIGNING ARITHMETIC BUILDING BLOCKS-

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, speed and area trade-off.

LOW POWER DESIGN

Low – Power CMOS Logic Circuits: Introduction, Overview of Power Consumption, Low – Power Design through voltage scaling, Estimation and Optimization of switching activity.

UNIT V -DESIGN FOR TESTABILITY

Design for Testability: Introduction, Fault Types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based and BIST Techniques

IMPLEMENTATION STRATEGIES

Full custom and Semi-custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

Text Book:

1. Sung-Mo Kang &YosufLeblebici, ―CMOS Digital Integrated Circuits: Analysis & Design‖,Mcgraw Hill, 4th Edition.
2. . D. A. Pucknell and K. Eshraghian, ―Basic VLSI Design: Systems and Circuits‖, PHI, 3rd Ed.,1994.

Reference Books:

1. Neil H.E. Weste, David Money Harris, ―CMOS VLSI Design – A circuits and Systems Perspective‖ Pearson, 4th Edition
2. Jan M. Rabeay, ―Digital Integrated Circuits-A Design Perspective‖, PHI, 2nd Ed.

B. Tech VI Semester	L	T	P	C
	3	0	0	3

18EC6T02-ANTENNAS AND WAVE PROPAGATION

Course Overview:

It gives comprehensive study of basic antenna fundamentals, types of antennas, radiation pattern, main lobes and side lobes. Student will come to know how the different antennas work, student also gain knowledge in microwave antennas, antenna arrays. Wave propagation concepts, frequency range, transmission losses, calculations, space wave propagation, and troposphere wave propagation.

Prerequisite(s): Electromagnetic waves and Transmission Lines.

Course Objectives:

1. To understand the basic terminology and concepts of Antennas.
2. To attain knowledge on the basic parameters those are considered in the antenna design process and the analysis while designing that.
3. Analyze the electric and magnetic field emission from various basic antennas and mathematical formulation of the analysis.
4. To have knowledge on antenna operation and types as well their usage in real time field.
5. Aware of the wave spectrum and respective band based antenna usage and also to know the propagation of the waves at different frequencies through different layers in the existing layered free space environment structure. **Course Outcomes:**

After going through this course the student will be able to

1. Define various antenna parameters
2. Analyze radiation patterns of antennas
3. Evaluate antennas for given specifications
4. Illustrate techniques for antenna parameter measurements
5. Design antennas for specific applications

SYLLABUS

UNIT-I

ANTENNA BASICS:

Introduction, Basic antenna parameters- patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity- Gain-Resolution, Effective height, Antenna Apertures, Friis transmission formula, Illustrative problems. Fields from oscillating dipole, Antenna temperature, front–to-back ratio, basic Maxwell‘s equations, retarded Potential- Helmholtz Theorem, Radiation from Small Electric Dipole, Quarter wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Directivity, Effective Area and Effective Height, Natural current distributions, far fields.

UNIT- II

THIN LINEAR WIRE ANTENNAS:

Small Electric Dipole, Quarter wave Monopole and Half Wave Dipole, Long wire antennas, V-antennas, Rhombic Antennas, Small Loop antennas, Helical Antennas, Design Relations.

UNIT-III

ANTENNA ARRAYS:

Two element array, Principle of Pattern Multiplication, N element Uniform Linear Arrays - Broadside, End fire Arrays, EFA with Increased directivity, Binomial Arrays, Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial array

UNIT-IV

MICROWAVE ANTENNAS:

Reflector Antennas: Yagi Uda Antenna, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors, Prime focus horn, offset fed and Cassegrain Feeds, Slot antennas-Babinet's principle, Microstrip (patch) antennas, Lens antennas **ANTENNA MEASUREMENT THEORY:**

Antenna Measurements-Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and Three Antenna Methods)

UNIT-V

WAVE PROPAGATION:

Overview of propagation effects, Flat and Spherical Earth Considerations, Ground Wave propagation, Sky Wave Propagation Formation of Ionospheric Layers and their characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF & Skip Distance, Virtual Height, Space Wave Propagation, Duct Propagation, Tropospheric Scattering, Fading and Multipath.

TEXT BOOKS:

1. E. C. Jordan and K. G. Balmain, ―Electromagnetic Waves and Radiating Systems‖, PHI, 2nd edition, 2000.
2. John D. Kraus and Ronald J. Marhefka, ‒Antennas and Wave propagation‖ TMH, 4th Edition, 2010

REFERENCES:

1. G.S.N Raju, ―Antennas and Wave Propagation‖, 1st Edn Pearson Education, 2004.
2. C.A. Balanis, ―Antenna Theory Analysis and Design‖, 4th Edn.,John Wiley & Sons, 2016.

B. Tech VI Semester

L	T	P	C
3	0	0	3

18EC6T03-CELLULAR AND MOBILE COMMUNICATIONS (PROFESSIONAL ELECTIVE 1)

COURSE OBJECTIVE: Students should familiarize with different cellular systems, channel allocations with bandwidth utilizations, signal traffic in cellular systems, frequency management and handoffs.

COURSE OUTCOMES:

The student will be introduced to:

1. Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems.
2. Understand the different types of interference s influencing cellular and mobile communications.
3. Understand the frequency management, channel assignment and various propagation effects in cellular environment.
4. Understand the different types antennas used at cell site and mobile.
5. Understand the concepts of handoff and types of handoffs.

UNIT I

CELLULAR SYSTEMS:

Limitations of Conventional System , Basic Cellular Mobile System ,First, second ,third and fourth Generation cellular wireless systems .Operation of Cellular System .

Fundamentals of cellular Radio System Design: concept of frequency reuse channels, Co-channel Interference, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system

UNIT II

CO-CHANNEL & NON CO-CHANNEL INTERFERENCE: Measurement of Real Time Co-Channel Interference, design of Antenna system, Antenna parameters and their effects

Non-cochannel interference-adjacent channel interference, Near End far end interference,

UNIT III

CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, and general formula for mobile propagation over water and flat open area, near and long distance propagation.

UNIT IV

CELL SITE AND MOBILE ANTENNAS: Space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, Mobile Antennas.

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

UNIT V

HANDOFFS: Handoff Initiation, types of handoff, delaying handoff, advantages of Handoff, power difference handoff, forced handoff, mobile assisted and soft handoff. Intersystem handoff

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn.,2006.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn.,2002.

REFERENCES:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition,2001.
2. Modern Wireless Communication –Simon Haykin Michael Moher, Persons Eduction,2005.

B. Tech VI Semester

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18EC6T04-INTERNET OF THINGS
(PROFESSIONAL ELECTIVE 1)

Prerequisites :Fundamentals of Computer Network, Computer Network Course

Objectives :

1. To understand what Internet of Things is.
2. To get basic knowledge of RFID Technology, Sensor Technology and Satellite Technology.
3. To make students aware of resource management and security issues in Internet of Things.

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

1. Explain what Internet of Thins is.
2. Describe key technologies in Internet of Things.
3. Understand wireless sensor network architecture and its framework along with WSN applications.
4. Explain resource management in the Internet of Things.
5. Explain Internet Of Things Privacy, Security And Governance

UNIT - I INTRODUCTION

What is the Internet of Things? : History of IoT, About IoT, Overview and Motivations, Examples of Applications, Internet of Things Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities

UNIT - II FUNDAMENTAL IoT MECHANISMS AND KEY TECHNOLOGIES

Identification of IoT Objects and Services, Structural Aspects of the IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology.

UNIT - III RADIO FREQUENCY IDENTIFICATION TECHNOLOGY RFID:

Introduction, Principle of RFID, Components of an RFID system, Issues EPCGlobal Architecture Framework: EPCIS & ONS, Design issues, Technological challenges, Security challenges, IP for IoT, Web of Things. Wireless Sensor Networks: History and context, WSN Architecture, the node, Connecting nodes, Networking Nodes, Securing Communication WSN specific IoT applications, challenges: Security, QoS, Configuration, Various integration approaches, Data link layer protocols, routing protocols and infrastructure establishment.

UNIT - IV RESOURCE MANAGEMENT IN THE INTERNET OF THINGS

Clustering, Software Agents, Clustering Principles in an Internet of ThingsArchitecture, Design Guidelines, and Software Agents for Object Representation, Data Synchronization. Identity portrayal, Identity management, various identity management models: Local, Network, Federated and global web identity, user-centric identity management, device centric identity management and hybrid-identity management, Identity and trust.

UNIT - V INTERNET OF THINGS PRIVACY, SECURITY AND GOVERNANCE

Vulnerabilities of IoT, Security requirements, Threat analysis, Use cases and misuse cases, IoT security

tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.

Text Books

1. Daniel Minoli, ―Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications‖, ISBN: 978-1-118-47347-4, Willy Publications
2. Bernd Scholz-Reiter, Florian Michahelles, ―Architecting the Internet of Things‖, ISBN 978-3- 642-19156-5 e- ISBN 978-3-642-19157-2, Springer

Reference Books

1. HakimaChaouchi, ― The Internet of Things Connecting Objects to the Web‖ ISBN : 978-1- 84821-140-7, Willy Publications
2. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2 nd Edition, Willy Publications

B. Tech VI Semester

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18EC6T05-DSP PROCESSORS AND ARCHITECTURE
(PROFESSIONAL ELECTIVE 1)

COURSE OBJECTIVE: Students able to familiarize with DSP systems, Discrete transforms, digital filters design procedures, Computations and accuracy with DSP systems, programmable DSP systems and different DSP processors and architectures.

COURSE OUTCOMES: After completion of the course students able to
1. Evaluate the transformations and design of filters
2. Compute the accuracy and errors in DSP implementations
3. Analyze the Architectures of DSP systems
4. Write program for DSP and able to distinguish with GPP
5. Distinguish different DSP families.

UNIT-I

Introduction to Digital Signal Processing Introduction, a Digital signal processing system, the sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

UNIT-II

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, Compensating filter.

UNIT-III

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-IV

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

UNIT-V

Analog Devices Family of DSP Devices Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach To Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications- B. Venkataramani and M. Bhaskar, 2002, TMH.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.

B. Tech VI Semester

L	T	P	C
3	0	0	3

18EC6T06-OOPS Through JAVA

COURSE OBJECTIVES:

1. Understanding the OOPS concepts classes and objects, threads, files, applets, swings and act
2. The course introduces computer programming using the Java programming language with object-oriented programming principles.
3. Emphasis is placed on event driven programming methods, including creating and manipulating objects, classes and using Java for network level programming and middleware development.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

1. Understand the principles of object oriented concepts. Define classes and objects by identifying real world entities, their properties and functionalities.
2. Reuse the existing classes by using inheritance and understand the concepts of packages and exception handling.
3. Make use of built-in classes in Java and understand the concept of thread.
4. Develop user interfaces using applets, AWT and Event handling in java.
5. Create portable GUI applications using Swing components.

SYLLABUS:

UNIT-I:

Introduction to OOP, procedural programming language vs object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector.

UNIT-II:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

Exception handling, importance of try, catch, throw, throws and finally block, userdefined exceptions, Assertions.

UNIT-III:

Multithreading: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-IV:

Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

UNIT-V:

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List, Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

TEXT BOOKS:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. JAVA for Beginners,4e,JoyceFarrell,Ankit R. Bhavsar,Cengage Learning.
4. Object oriented programming with JAVA,Essentials and Applications, Raj Kumar Bhuyya,Selvi,Chu,TMH.
5. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

1.Java Programming,K.Rajkumar.Pearson
2.Core Java,BlackBook,RNageswararao,Wiley,Dream Tech 3.Core Java for Beginners, Rashmi Kanta Das, vikas.
4.Object Oriented Programming Through java, P.Radha Krishna,Universities Press

B. Tech VI Semester	L	T	P	C
	3	0	0	3

18EC6T07-Employability skills 2
(OPEN ELECTIVE-II)

COURSE OBJECTIVES:

COURSE OUTCOMES:

SYLLABUS:

Unit-I:
Divisibility and remainder rules of numbers,Unit digit , square root, cube root and simplification of numbers, HCF and LCM of numbers, Averages and Percentages Alphabetical and miscellaneous series, Coding and decoding and Blood Relations

Unit-II:
Profit & loss, Simple interest and Compound interest Direction, Order and Ranking, Sitting arrangement and Puzzle

Unit-III:
Ratio & proportions, Partnership, Alligation and mixtures and Ages.Data sufficiency, Inequalities and Decision making .

Unit-IV:
Time and work, Pipes & cisterns and Time and distance .Syllogism, Statement and course of action and Statement and Assumption.

Unit-V:
Boats and streams, Areas, Volume and surface areas.Statement and argument, Cause and effect and Drawing inference.

Text Books:
1) ―Objective Arithmetic‖ by R.S. Agarwal, S. Chand Publications.
2) Verbal and non-verbal Reasoning, R.S. Agarwal, S. Chand Publications

REFERENCES:
1) Quantitative Aptitude by Dinesh Khattar, Pearson Education.
2) .Quantitative Aptitude by Abhjit Guha.
3) Fast Track objective Arithmetic, Rajesh Verma, Arihant publications.

B. Tech VI Semester

L	T	P	C
3	0	0	3

18EC6T08-Computer Networks
(OPEN ELECTIVE-II)

OBJECTIVES:

• Understand state-of-the-art in network protocols, architectures, and applications.
• Process of networking research
• Constraints and thought processes for networking research
• Problem Formulation—Approach—Analysis—

OUTCOMES:

1. Understand OSI and TCP/IP models
2. Analyze MAC layer protocols and LAN technologies
3. Design applications using internet protocols
4. Understand routing and congestion control algorithms
5. Understand how internet works

UNIT – I

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

UNIT– II

Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing,Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window
Protocols

UNIT – III

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat

UNIT – IV

The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Multiple Access Protocols- Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

UNIT – V

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms-Approaches to Congestion Control-Traffic Aware Routing- Admission Control-Traffic Throttling-Load Shedding.

Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers,

Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

TEXT BOOKS:

1. Computer Networks, Tanenbaum and David J Wetherall, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

REFERENCE BOOKS:

1. Larry L. Peterson and Bruce S. Davie, ―Computer Networks - A Systems Approach‖ (5th ed), Morgan Kaufmann/ Elsevier, 2011
2. An Introduction to Computer Networks - Second Edition, Peter Lars Dordal, Loyola University of Chicago Copyright Year: 2014

B. Tech VI Semester

L	T	P	C
3	0	0	3

18EC6T09-EMBEDDED STSTEMS
(OPEN ELECTIVE-II)

OBJECTIVES:

1. Technology capabilities and limitations of the hardware, software components
2. Methods to evaluate design tradeoffs between different technology choices.
3. Design Methodologies

OUTCOMES:

Understand the basics of an embedded system
1. Program an embedded system
2. Design, implement and test an embedded system.
3. Identify the unique characteristics of real-time systems
4. Explain the general structure of a real-time system
5. Define the unique design problems and challenges of real-time systems

Syllabus

UNIT-I:

Introduction to Embedded systems:What is an embedded system Vs. General Computing system, history, classification, major application areas, Purpose of embedded systems, Core of embedded system, Characteristics and Quality Attributes of Embedded Systems, Application Specific and Domain specific embedded systems-Examples

UNIT-II:

Factors to be considered in selecting a controller, 8051 architecture, RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-III:

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher‘s problem.

UNIT-IV:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT-V:

Simulators, Emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009
2. Embedded Systems: A Contemporary Design Tool Paperback by James K. Peckol

REFERENCE BOOKS:

1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.

B. Tech VI Semester	L	T	P	C
	0	0	3	1.5

18EC6L10-VLSI DESIGN LAB

COURSE OBJECTIVES:

1. To study understand the MOS device at device , circuit and layout level
2. To learn the implementation of designed circuit on FPGA Board

COURSE OUTCOMES:

At the end of the course the students can able to

1. Design and analyse the MOS at device, circuit and layout level using back end CAD tool.
2. Design of combinational and sequential circuit using CAD tool
3. Design of Combinational and sequential circuit at gate level using Front end tool.

Experiment List:

1. To Study about PSPICE tool and λ (Lambda) Rules for Layout Generation.
2. To study electrical characteristics of NMOS (use 0.25um model) . Observe the variation in characteristics with the variation in process parameter.
3. Design CMOS Inverter with given specifications. Obtain the following:

a) Voltage transfer curve.
b) Propagation delay
c) Tphl and Tplh
d) Noise Margin

Compare the measured results with theoretical results.

4. Design and Implement 6T XOR gate .
5. Design and Implementation of 4-bit full adder and analyse power, area and timing.
6. Design D-latch and analyze the power, area and timing
7. Design 2-input CMOS NAND gate. Verify the logic and compare result of pre-layout and post layout.

Obtain the following for Experiment No. 1-7:

a. Draw the schematic and verify the following
i) DC Analysis
ii) Transient Analysis
b. Draw the Layout and verify the DRC, ERC
c. Check for LVS
d. Extract RC and back annotate the same and verify the Design
e. Verify & Optimize for Time, Power and Area to the given constraint

8. Write Verilog Code for the following circuits and their Test Bench for verification, observe the waveform and synthesize the code with technological library with given constraints*. Do the initial timing verification with gate level simulation.

i. An inverter
ii. A Buffer
iii. Transmission Gate
iv. Basic/universal gates
v. Flip flop -RS, D-FF, JK, Master Slave JK FF, T-FF

9. Write Verilog Code for the following circuits and their Test Bench for verification, observe the waveform and synthesize the code with technological library with given constraints*. Do the initial timing verification with gate level simulation.

i. Serial & Parallel adder
ii. 4-bit counter [Synchronous and Asynchronous counter]

10. Design and Implement Traffic Light Controller on FPGA Board.

B. Tech VI Semester	**L**	**T**	**P**	**C**
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18EC6L11- OOPS through JAVA lab

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

1. Understand the behavior of primitive data types, object references, and arrays.
2. Implement Java classes from specifications
3. Implement interfaces, inheritance, and polymorphism as programming techniques
4. Apply exceptions handling.

LIST OF LAB EXPERIMENTS:

Exercise - 1 (Basics)

a). Write a JAVA program to display default value of all primitive data type of JAVA

b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b). Write a JAVA program to sort for an element in a given list of elements using bubble sort

(c). Write a JAVA program to sort for an element in a given list of elements using merge sort.

(d) Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3 (Class, Objects)

a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b). Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a). Write a JAVA program to implement constructor overloading.

b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a). Write a JAVA program to implement Single Inheritance.

b). Write a JAVA program to implement multi level Inheritance.

c). Write a java program showing the usage of abstract class.

Exercise - 6 (Inheritance - Continued)

a). Write a JAVA program give example for ―super‖ keyword. b). Write a JAVA program to implement Interface.

Exercise - 7 (Exception)

a).Write a JAVA program that describes exception handling mechanism b).Write a JAVA program Illustrating Multiple catch clauses.

Exercise – 8 (Runtime Polymorphism)

a). Write a JAVA program that implements Runtime polymorphism

Exercise – 9 (Exception)

a). Write a JAVA program Illustrating exception handling keywords. b). Write a JAVA program for creation of Java Built-in Exceptions c).Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

a). Write a JAVA program that creates threads by extending Thread class. b). Write a program illustrating **isAlive** and **join ()**

c). Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

a).Write a JAVA program Producer Consumer Problem

b).Write a case study on thread Synchronization after solving the above producer consumer problem.

Exercise – 12 (Packages)

a). Write a JAVA program illustrate class path

b). Write a case study on including in class path in your os environment of your package. c). Write a JAVA program that import and use your package in the previous Problem.

Exercise - 13 (Applet)

a).Write a JAVA program to paint like paint brush in applet.

b). Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

a).Write a JAVA program that display the x and y position of the cursor movement using Mouse. b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

B. Tech VI Semester

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18EC6L12-Technical Seminar

The students are required to select current challenges and develop orientation skills relevant to the Electronics and Communication. The technical seminar should be given by individual student. The seminar topic should be innovative in development; student should give presentation and demonstration of seminar work study. The students are required to submit document of seminar report at the end.

COURSE OUTCOMES:

After going through this course the student will be able to

- Define the real world problems
- Acquire knowledge to solve and address the problem
- Improve presentation skills and writing skills
- Involve in both theoretical and practical survey work

The evaluation of Technical Seminar is done based on

1. Relevance of the Topic
2. Literature Survey
3. New Information involved in the Topic
4. Current age Acceptance of Seminar
5. Presentation and Communication skill of student
6. Seminar Report given by the Student

SEMESTER- VII

SYLLABUS

B. Tech VII Semester

L	T	P	C
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18EC7T01-EMBEDDED STSTEMS

OBJECTIVES:

1.Technology capabilities and limitations of the hardware, software components
2.Methods to evaluate design tradeoffs between different technology choices.
3.Design Methodologies

OUTCOMES:

Understand the basics of an embedded system
1.Program an embedded system
2.Design, implement and test an embedded system.
3.Identify the unique characteristics of real-time systems
4.Explain the general structure of a real-time system
5.Define the unique design problems and challenges of real-time systems

SYLLABUS

UNIT-I:

Introduction to Embedded systems:What is an embedded system Vs. General Computing system, history, classification, major application areas, Purpose of embedded systems, Core of embedded system, Characteristics and Quality Attributes of Embedded Systems, Application Specific and Domain specific embedded systems-Examples

UNIT-II:

Factors to be considered in selecting a controller, 8051 architecture, RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-III:

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher‘s problem.

UNIT-IV:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT-V:

Simulators, Emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.
2. Embedded Systems: A Contemporary Design Tool Paperback by James K. Peckol

REFERENCE BOOKS:

1.Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2.Embedded Systems, Rajkamal, TMH, 2009.

B. Tech VII Semester	L	T	P	C
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18EC7T02-Micro Wave Engineering

Course Overview:

To adopt microwave technology in diverse applications as radio astronomy, long distance communication, space navigation, radar systems, medical equipment and missile electronic systems. Because microwave communication system handles a large fraction of the world‘s international and other long-haul telephone, data and television transmissions. To use microwave technology in wireless communication system such as Direct Broadcast Satellites (DBS) television, personal communication system (PCS), Wireless Local Area Networks (WLAN‘s), Cellular Video (CV) Systems, and global positioning Satellite (GPS) Systems operate in the frequency of range (1.5 GHZ to 94 GHZ). Thus really heavily on microwave technology.

Prerequisite(s): Electromagnetic waves and Transmission Lines, Antenna and wave Propagation.

Course Objectives:

The Student Will

1. Understand Fundamental Electrical Characteristics of Waveguides and Transmission Lines Through Electromagnetic Field Analysis.
2. Understand The Basic Properties of Polarization and Ferrite Materials Composition in The Case of Waveguide Components.
3. Understand The Multiport Junction Concept for Splitting the Microwave Energy in A Desired Direction.
4. Understand The Function, Design, And Integration of the Major Microwave Components Like Oscillator, Modulator, Power Amplifier, Filter
5. Familiarize Mixer in Building a Microwave Test Bench Setup for Measurements.

Course Outcomes:

After Going Through This Course the Student Will

1. Gain Knowledge of Transmission Lines and Waveguide Structures and How They Are Used as Elements in Impedance Matching and Filter Circuits.
2. Apply Analysis Methods to Determine Circuit Properties of Passive or Active Microwave Devices.
3. Gain Knowledge and Understanding of Microwave Analysis Methods.
4. Distinguish Between M-Type and O-Type Tubes
5. Analyze and Measure Various Microwave Parameters Using a Microwave Test Bench

SYLLABU

S UNIT I

RECTANGULAR & CIRCULAR WAVEGUIDES:

Introduction to microwave communication and EM spectrum, Rectangular wave guide: Field Components, TE, TM Modes, Dominant TE10 mode, Field Distribution, Power, Attenuation. Circular waveguides: TE, TM modes. Wave velocities, Micro strip transmission line (TL), Coupled TL, Strip TL, Coupled strip line, Coplanar TL, Microwave cavities

UNIT II

PASSIVE MICROWAVE DEVICES:

Scattering matrix, Passive microwave devices: Microwave hybrid circuits, Terminations, Attenuators, Phase Shifters, Directional couplers: Two-hole directional couplers, S- Matrix of a directional coupler, Hybrid couplers, Microwave propagation in ferrites, Faraday rotation, Isolators, Circulators. S-parameter analysis of all components.

UNIT III MICROWAVE TUBES:

Microwave tubes: Limitations of conventional active devices at microwave frequency, two cavity Klystron, Reflex Klystron, Magnetron, Traveling wave tube, Backward wave oscillators,

UNIT IV

SOLID STATE AMPLIFIERS AND OSCILLATORS:

Transferred electron devices: Gunn-effect diodes & modes of operation. Avalanche transit – time devices: IMPATT diode, TRAPPAT diode, BARITT diode.

UNIT V

MICROWAVE MEASUREMENTS:

Microwave power measurement, Insertion loss and attenuation measurement, VSWR measurement, Frequency measurement, measurement of cavity Q, Dielectric constant measurement of a solid.

TEXT BOOKS:

1. Samuel Y. Liao, ―Microwave Devices and Circuits‖, 3rd Edition, Pearson Education, 2011 Reprint.
2. Collin.R.E, ―Foundations For Microwave Engineering‖, 2nd Edition, Tata Mcgraw Hill, 2006.

REFERENCES:

1. Microwave and Radar Engineering – G Sasibhushana Rao Pearson
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.

B. Tech VII Semester	L	T	P	C
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18EC7T03-Wireless Sensor Network
(PROFESSIONAL ELECTIVE-II)

Course Outcomes: After Going Through This Course the Student Will
1. To know the basic concepts of Sensor Networks
2. To understand the concept of Deployment and Configuration
3. To know Routing Protocals
4. To understand the concept of Transport Layer And Security Protocols
5. To know Data storage & Manipulations

Unit-I

Introduction: Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Mobile AdhocNETworks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks,Sensor Node Hardware and Network Architecture: Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC, Network architecture, Optimization goals and figures of merit, Design principles for WSNs, Service interfaces of WSNs, Gateway concepts.

Unit-II

Deployment and Configuration: Localization and positioning, Coverage and connectivity, Single-hop and multi hop localization, self configuring localization systems, sensor management Network Protocols: Issues in designing MAC protocol for WSNs, Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and Zig Bee, Dissemination protocol for large sensor network.

UNIT-III

ROUTING PROTOCOLS: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.

UNIT-IV

TRANSPORT LAYER AND SECURITY PROTOCOLS: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks

Unit-V

Data Storage and Manipulation: Data centric and content based routing, storage and retrieval in network, compression technologies for WSN, Data aggregation technique. Applications: Detecting unauthorized activity using a sensor network, WSN for Habitat Monitoring.

TEXT BOOKS

1. Holger Kerl, Andreas Willig, ―Protocols and Architectures for Wireless Sensor Network‖, John Wiley and Sons, 2005 (ISBN: 978-0-470-09511-9)
2. Raghavendra, Cauligi S, Sivalingam, Krishna M., ZantiTaieb, ―Wireless Sensor Network‖, Springer 1st Ed. 2004 (ISBN: 978-4020-7883-5).

REFERENCE

1. Kazem, Sohraby, Daniel Minoli, TaiebZanti, ―Wireless Sensor Network: Technology, Protocols and Application‖, John Wiley and Sons 1st Ed., 2007 (ISBN: 978-0-471-74300-2).
2. B. Krishnamachari, ― Networking Wireless Sensors‖, Cambridge University Press.

B. Tech VII Semester	L	T	P	C
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18EC7T04-RADAR ENGINEERING
(Professional Elective II)

OBJECTIVES

The student will be introduced to:

1. The Basic Principle of radar and radar range equation.
2. Different types of radars; CW, FM-CW, MTI and pulse Doppler radars.
3. Understand the different tracking techniques for radar.
4. Understand the characteristics of a matched filter receiver and its performance.
5. Understand the different types of displays, duplexers and antennas used in radar systems.

OUTCOMES

After going through this course the student will be able to:

1. Derive the radar range equation and to solve some analytical problems.
2. Understand the different types of radars and its applications.
3. Understand the concept of tracking and different tracking techniques.
4. Understand the various components of radar receiver and its performance
5. Analyze different types of displays, duplexers and antennas used in radar systems.

UNIT–I:Basics of Radar

Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar BlockDiagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, MinimumDetectable Signal, Receiver Noise, Illustrative Problems.

Radar Equation: Modified Radar Range Equation, SNR, and probability of detection, probability of False Alarm,Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere),Transmitter Power, PRF and Range Ambiguities, Illustrative Problems.

UNIT–II:CW and Frequency Modulated Radar

Doppler Effect, CW Radar – Block Diagram, Isolation betweenTransmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.Illustrative Problems

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics.

UNIT-III:MTI and Pulse Doppler radar

Introduction, Principle, MTI Radar with - Power Amplifier Transmitter andPower Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar block diagram, Parameters, Limitations to MTIPerformance.

UNIT –IV:

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – AmplitudeComparison Mono pulse, Phase Comparison Mono pulse, tracking in Range,Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT –V:

Radar Receivers –Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers.Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Widthchanges, Series versus parallel feeds, Applications, Advantages and Limitations.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Ed., 2007.
2. Principles of Modern Radar: Basic Principles: Mark A. Richards, James A. Scheer, William A

REFERENCE BOOKS:

1. Introduction to Radar Systems, 3rd edition – M.I. Skolnik, TMH Ed., 2005
2. Radar: Principles, Technology, Applications – Byron Edde, Pearson Education, 2004..

B. Tech VII Semester	L	T	P	C
	3	0	0	3

18EC7T05-DIGITAL IMAGE PROCESSING
(Professional Elective II)

Course Objectives:

1. To comprehend the relation between human visual system and machine perception and processing of digital images.
2. To provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.

Course Outcomes: After Going Through This Course the Student Will

1. Exploration of the limitations of the computational methods on digital images.
2. Expected to implement the spatial and frequency domain image transforms on enhancement and restoration of images.
3. Elaborate understanding on image enhancement techniques.
4. Understand image segmentation techniques.
5. Expected to define the need for compression and evaluate the basic compression algorithms.

UNIT - I Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT - II Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering. Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

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

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

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

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

TEXT BOOKS:

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- MC GRAW HILL 2010

REFERENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - ScotteUmbaugh, 2nd Ed, CRC Press, 2011
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, MC GRAW HILL EDUCATION, 2010.

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B. Tech VII Semester	L	T	P	C
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18EC7T06-SATELLITE COMMUNICATION
(Professional Elective III)

COURSE OBJECTIVES
The student will be introduced to:
1. Understand the concepts, applications and subsystems of Satellite communications.
2. Derive the expression for G/T ratio and to solve some analytical problems on satellite link design
3. Understand the concepts of satellite navigation, architecture and applications of GPS.

COURSE OUTCOMES
At the end of this course the student can able to:
1. Understand the basic concepts, applications, frequencies used and types of satellite communications.
2. Understand the concept of look angles, launches and launch vehicles and orbital effects in satellite Communications.
3. Understand the various satellite subsystems and its functionality.
4. Understand the concepts of satellite link design and calculation of C/N ratio.
5. Understand the concepts of multiple access and various types of multiple access techniques in satellite Systems.

UNIT I
INTRODUCTION: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications.
ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, orbital elements, launches and launch vehicles, Orbital effects in communication systems performance. **UNIT II**
SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and Monitoring, power systems, communication subsystems, Satellite antenna, Equipment reliability and Space qualification.
UNIT III
SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.
UNIT IV
MULTIPLE ACCESS: Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.
UNIT V
SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPSNavigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.
TEXT BOOKS:
1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.
REFERENCES:
1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.

B. Tech VII Semester	L	T	P	C
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18EC7T07- CONSUMER ELECTRONICS
(Professional Elective III)

COURSE OUTCOMES:

Upon the completion of this course, students will demonstrate the ability to:

1. Understand electronics engineering concepts used in consumer electronics systems.
2. Identify the need of preventive maintenance in various electronic appliances.
3. Use different product safety, compliance standards and techniques associated with electronic products.
4. Evaluate and analyze different electronic products and systems based on specifications.
5. Manage multi-faceted and multi-disciplinary projects with significant technical considerations using a broad systems perspective.

UNIT I

AUDIOSYSTEM: Microphones,loudspeakersbaffleandenclosure,Acoustics,mono,stereo,Quad,Amplifying System,EqualizersandMixersSynthesizers,CommercialSound,TheaterSoundSystem.

UNIT II

VIDEOSYSTEMSANDDISPLAYS: Monochrome, Color TV standards, TFT, Plasma, HDTV, LCD, LED TV, Direct-To-Home (DTH-Set Top Box),Video Telephoneand Video Conferencing.

UNIT III

DOMESTIC & CONSUMER APPLIANCES: Washing machines, Microwave ovens, Air-conditioners and Refrigerators, Computers office System, Telephone & Mobile Radio System.

UNIT IV

POWERSUPPLIES:SMPS/UPSandPreventiveMaintenanceandotherssystemssuchasRemotecontrols,Bar codes, RFID

UNIT V

PRODUCTCOMPLIANCE: Product safety and liability issues; standards related to electrical safety and fire hazards, EMI/EMC requirements, design techniques for ESD, RF interference and immunity, line current harmonics and mains voltage surge.

TEXTBOOKS:

1. Consumer Electronics ;SP Bali; Pearson Education.
2. Consumer Electronics ;J.S. Chitode; Technical Publications, Pune.

Reference Books:

1.Consumer Electronics by B.R. Gupta, Revised Edition
2. Consumer Electronics Paperback – 1 January 2013 by B.R. Gupta (Author), V. Singhal (Author)

B. Tech VII Semester	L	T	P	C
	3	0	0	3

18EC7T08-OPTICAL COMMUNICATION
(Professional Elective III)

OUTCOMES:
Upon the completion of this course, students will demonstrate the ability to:

1. Understand about the various optical fiber modes, configuration and transmission characteristics of optical fibers
2. Learn about the various optical sources, detectors and transmission techniques
3. Explore various idea about optical fiber measurements and various coupling techniques
4. Enrich the knowledge about optical communication systems and networks
5. Design optical system based on requirements.

UNIT I:INTRODUCTION TO OPTICAL FIBERS
Introduction to optical fiber communication system and advantages, Ray theory of transmission, total internal reflection, Acceptance Angle, Numerical Aperture, Skew Rays, Optical Fiber waveguide- Modes, Vnumber, Mode Coupling, Step Index Fibers, Graded Index Fibers. Single Mode Fibers- Cut off Wavelength, Mode Field Diameter, Effective Refractive Index

UNIT II: TRANSMISSION CHARACTERISTIC AND DISTORTION
Fiber Materials,Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses, Types of Dispersion – Material Dispersion, Wave- Guide Dispersion, Polarization Mode Dispersion, Intermodal Dispersion, Pulse Broadening, Optical Fiber Connectors- Connector Types, Connector Return Loss.Fiber Splicing: Splicing Techniques, Fiber Alignment and Joint Loss

UNIT III: OPTICAL SOURCES AND DETECTORS
Optical Sources- LEDs, Structures, Materials, surface emitting LED, Edge emitting LED, quantum efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes- Modes, Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Detectors: PIN photo detector and Avalanche photo diodes

UNIT IV: POWER LAUNCHING AND RECEPTION
Source to Fiber Power Launching: – Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling, optical receiver operation, digital signal transmissionerror sources, digital receiver performance-probability of error-receiver sensitivity-quantum limit.

UNIT V: OPTICAL SYSTEM DESIGN
Optical System design consideration-Point to Point link design, Link power budget, rise time budget, WDM principles and necessity, Measurement of Attenuation and Dispersion, Eye pattern

TEXT BOOKS
1. Optical Fiber Communications — Gerd Keiser, TMH, 4th Edition, 2008.
2. Optical Fiber Communications — John M. Senior, Pearson Education, 3rd Edition, 2009.

REFERENCE BOOKS
1. Fiber Optic Communications — D.K. Mynbaev, S.C. Gupta and Lowell L. Schemer, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications — S.C.Gupta, PHI, 2005.

B. Tech VII Semester	L	T	P	C
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18EC7T09-Computer Architecture & Organization

(OPEN ELECTIVE-III)

OBJECTIVES:

1. Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
2. In addition to this the memory management system of computer.

Course outcomes: After Going Through This Course the Student Will

1. To know the Basic Structure of computers
2. To know the Register Transfer Language And Micro operations
3. To understand the memory concepts
4. To know the memory systems
5. To understand the concept of input output organization

UNIT-I

BASIC STRUCTURE OF COMPUTERS: The history of Computer development, Computer Types, Functional units, Basic operational concepts, Bus structures, System Software, Performance,Data types, Complements, Data Representation. Fixed Point Representation. Decimal Arithmetic operations Floating – Point Representation.

UNIT-II

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer, Bus and memory transfer, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle. Memory
– Reference Instructions. Input – Output and Interrupt.

UNIT-III

CENTRAL PROCESSING UNIT: Stack Organization. Instruction formats. Addressing modes. Data Transfer and manipulation. Program control.

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control

UNIT-IV

THE MEMORY SYSTEM: Memory Hierarchy, Main Memory- RAM, ROM, PROM, EPROM, EEPROM , Flash Memory, Associative memory, Cache Memories: Mapping Functions, Virtual memory, Auxiliary memory, Secondary Storage: Magnetic Hard Discs, Optical Disks, Memory management hardware.

UNIT -V

INPUT-OUTPUT ORGANIZATION : Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

TEXT BOOKS:

1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
2. Computer Architecture and Organization – John P. Hayes, Mc Graw Hill International editions, 1998.

REFERENCES:

1. Computer Organization and Architecture – William Stallings 7th Edition, PHI/Pearson, 2006.
2. Computer Organization – Car Hamacher, ZvonksVranesic, SafwatZaky, 5th Edition, McGraw Hill, 2002

B. Tech VII Semester	L	T	P	C
	3	0	0	3

18EC7T10-BIO MEDICAL ENGINEERING

(OPEN ELECTIVE-III)

COURSE OBJECTIVES

1. To introduce student to basic biomedical engineeringtechnology
2. To understand the anatomy & physiology of major systems of the body in designing equipment for medicaltreatments.
3. To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.

COURSE- OUTCOMES: After Going Through This Course the Student Will

1. To understand diagnosis and therapy relatedequipments.
2. To understand the problem and identify the necessity of equipment for diagnosis and therapy.
3. To understand the importance of electronics engineering in medicalfield.
4. To understand the importance of telemetry in patientcare
5. To know the Diagnostic Techniques

UNIT-1:

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION:Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV:

PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids, Laparoscope, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention,

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

Text Books:

1. Bio-Medical Electronics and Instrumentation‖, Onkar N. Pandey, Rakesh Kumar, Katson Books.
2. Bio-Medical Instrumentation‖, Cromwell , Wiebell, Pfeiffer

References

1. Introduction to Bio-Medical Equipment Technology‖, 4th Edition, Joseph J. Carr, John M. Brown, Pearson Publications.
2. Hand Book of Bio-Medical Instrumentation‖, Instrumentation‖, Kandahar. McGraw-Hill

B. Tech VII Semester

L	T	P	C
3	0	0	3

18EC7T11-NANO ELECTRONICS

(OPEN ELECTIVE-III)

COURSE OBJECTIVE: This course is intended to cover basics of electronics, transistor, band structure models, nanocapacitors, coulomb blockade, single electron transistor and nanophotonics.

COURSE OUTCOME of the study: After Going Through This Course the Student Will

1. To know nanoelectronics holds the capacity for mass production of high-quality nanodevices with an enormous variety of applications from computers to biosensors, from cell phone to space shuttles and from large display screens to small electronic toys.
2. To know the scaling of transistors and other devices to smaller and smaller sizes, which has provided the basis for this exponential growth, has limits, physical (size of the atoms), technological (lithography) and economic, which will be reached by nanoelectronics in the next coming decade.
3. To understand the materials of nanoelectronics
4. To know Ballistic and Diffusive Transport
5. To understand the concept of quantum dots

UNIT-I

Basics of nano linear optics and electronics**.**Free Electron Theory & The New Ohm‘s Law: Why Electrons flow, Classical free electron theory, Sommerfeld's theory, The quantum of conductance, Coulomb blockade, Towards Ohm‘s law. The Elastic Resistor: Conductance of an Elastic Resistor, Elastic Resistor- Heat dissipation.

Unit-II:

Materials for nanoelectronics: Semiconductors, Crystal lattices: bonding in crystals, Electron energy bands, Semiconductor heterostructures , Lattice-matched and pseudomorphicheterostructures Inorganic nanowires, Organic semiconductors , Carbon nanomaterials: nanotubes and fullerenes

UNIT-III:

Ballistic and Diffusive Transport: Ballistic and Diffusive Transfer Times, Channels for Conduction Conductivity, Conductivity: E(p) or E(k) Relations, Counting States, Drude Formula, Quantized Conductance, Electron Density - Conductivity

Unit-IV:

Electron transport in semiconductors and nanostructures Time and length scales of the electrons in solids, Statistics of the electrons in solids and nanostructures, Fermi statistics for electrons, the density of states of electrons in nanostructures, Electron transport in nanostructures.

Unit - V:

Electrons in traditional low-dimensional structures Electrons in quantum wells: Single modulation-doped heterojunctions, Numerical analysis of a single heterojunction, Control of charge transfer, Electrons in quantum wires, Electron transport in quantum wires, Electrons in quantum dots .

TEXT BOOK:

1. Introduction to Nano Science and Technology by S.M. Lindsay.
2. Supriyo Dutta -Lessons from Nanoscience: A Lecture Note Series, World Scientific (2012).

REFERENCE

1. Michael Wilson, KamaliKannangara, Geoff Smith, Michelle Simmons and Burkhard
2. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002

B. Tech VII Semester	L	T	P	C
	1	0	2	2

18EC6L12-MICROWAVE & OC LAB

COURSE OUTCOMES

1. The student will be able to understand the characteristic of Optical fiber.
2. The student will be able to Differentiate analog and digital link.
3. The student will be able to Measure the power and attenuation of optical and microwave devices.
4. The student will be able to Microwave parameter measurement of Gunn diode and Reflex Klystron.
5. Able to determine numerical aperture and attenuation of optical fiber.

INTRODUCTION:

This lab is offered to B.Tech. ECE students and concentrates on introducing the advances in communications. This lab is well equipped with all the microwave devices. The Laboratory conducts practical sessions to enable the students to implement their theoretical knowledge and observe the practical results, following outcome based education.

Lab deals with the measurements of the signals at micro frequency range. It involves measurement of frequency, wave length, VSWR, Impedance and scattering parameters of various micro wave devices like Circulator, Direction Coupler, and Magic-Tee. Even the latest trend of communication technology i.e., fiber optics is also introduced and propagation conditions will be verified by evaluating the losses.

LIST OF EXPERIMENTS

MICROWAVE

EXPERIMENTS

1. Basic microwave parameter measurement such as Frequency, wavelength, Attenuation, Power, VSWR, and Impedance.
2. Reflex klystron characteristics.
3. GUNN diode characteristics.
4. S - parameter Measurement of the following microwave components.
Isolator, Circulator, Directional Coupler, E plane Tee, H plane Tee,
Magic Tee.
5. Radiation Pattern of Horn Antenna.

OPTICAL EXPERIMENTS

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

B. Tech VII Semester	**L**	**T**	**P**	**C**
	0	0	2	2

18EC7P13-INDUSTRIAL INTERNSHIP

The students are required take internship at reputed industries to design and develop prototype model relevant to the Electronics and Communication. The internship should be done by individual student. The internship should done either at industry or in institute in connection with industry; student should give presentation and demonstration of internship. The students are required to submit document of internship report at the end.

COURSE OUTCOMES:

After going through this the student will be able to

- Understand the real world problems
- Aquitaine with industry interaction skills
- Gain knowledge to solve and address the problem
- Improve presentation skills and writing skills
- Involve in industrial needs related work

The evaluation is done based on

1. Industry Interaction by student
2. Complexity of problems understand at industry
3. Activities taken place at Industry
4. Any Design and Development in work
5. Presentation and Communication skill of student
6. Report given by the Student

SEMESTER- VIII

SYLLABUS

B. Tech VIII Semester	L	T	P	C
	3	0	0	3

18EC8T01-CODING THEORY and TECHNIQUES

COURSE OBJECTIVES:

1. Introduce The Principles and Applications of Information Theory.
2. To Teach Study How Information Is Measured in Terms of Probability and Entropy, And The Relationships Among Conditional and Joint Entropies.
3. To Teach Coding Schemes, Including Error Correcting Codes.
4. Explain How This Quantitative Measure of Information May Be Used in Order to Build Efficient Solutions to Multitudinous Engineering Problems.

COURSE OUTCOMES:

After completion of the course, the student is able to

CO1: Design the channel performance using Information theory.
CO2: Comprehend various error control code properties
CO3: Apply linear block codes for error detection and correction
CO4: Apply convolution codes for performance analysis & cyclic codes for error detection and correction.
CO5: Design BCH & RS codes for Channel performance improvement against burst errors.

Unit-I

Information Theory: Introduction, Measure of information, Information content of message, Average Information content of symbols in Long Independent sequences, Average Information content of symbols in Long dependent sequences, Statistical Model of Information Sources, Entropy and Information rate

Unit-II

Source Coding: Source coding theorem, Prefix Codes, Kraft McMillan Inequality Property Encoding of the Source Output, Shannon‘s Encoding Algorithm. Shannon Fano Encoding Algorithm, Huffman codes, Extended Huffman coding, Arithmetic Coding,

UNIT-III

Information Channels: Communication Channels, Channel Models, Channel Matrix, Joint probability Matrix, Binary Symmetric Channel, System Entropies, Mutual Information, Channel Capacity, Channel Capacity of: Binary Symmetric Channel.

UNIT-IV

Error Control Coding: Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes, Single Error Correcting Hamming Codes, Table lookup Decoding using Standard Array. Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction

UNIT-V

Some Important Cyclic Codes: Golay Codes, BCH Codes Convolution Codes: Convolution Encoder, Time

domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm)

Text, References &

Software Textbook:

1. Information Theory, Inference and Learning Algorithms by David J.C. MacKay. Draft 2.2.4 August 31, 2001.
2. Man Young Rhee, "Error Correcting Coding Theory", 1989, McGraw-Hill Man Young Rhee, "Error Correcting Coding Theory", 1989, McGraw-Hill

Reference book:

1. Elements of Information Theory, by Thomas M. Cover and Joy A. Thomas, John Wiley, 1991, ISBN 0-471- 06259-6
2. Todd K.Moon, "Error Correction Coding – Mathematical Methods and Algorithms", 2006, Wiley India

Software:

MATLAB or Mathcad and access to a C++

compiler **Internet Resources:**

http://www.inference.phy.cam.ac.uk/mackay/itp

rnn/

http://www.math.psu.edu/gunesch/entropy.htm

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T02-SPREAD SPECTRUM COMMUNICATIONS

(Professional Elective – IV)

Course Objectives:

The objectives of this course are to make the student

1. Understand the concept of Spread Spectrum and study various types of Spread spectrum sequences and their generation.
2. Understand the principles of Code Division Multiple Access (CDMA) and use of Spread spectrum concept in CDMA
3. Understand various Code tracing loops for optimum tracking of wideband signals viz spread spectrum signals.
4. Understand the procedure for synchronization of receiver for receiving the Spread spectrum signal.

Course Outcomes:

On completion of this course student will be able to

1. Generate various types of Spread spectrum sequences and can simulate CDMA system (Both Transmitter & Receiver).
2. Analyze the performance of Spread spectrum systems in Jamming environment and systems with Forward Error Correction.
3. Can provide detection and cancellation schemes for Multiuser in CDMA cellular radio.
4. Understand various Code tracing loops for optimum tracking of wideband signals viz spread spectrum signals.
5. Understand the procedure for synchronization of receiver for receiving the Spread spectrum signal

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

Cellular Code Division Multiple Access (CDMA) Principles: Introduction, Wide Band Mobile Channel,

The Cellular CDMA System, Single User Receiver in a Multi User Channel, CDMA System Capacity. Multi-User Detection in CDMA Cellular Radio: Optimal Multi-User Detection, Linear Suboptimal Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques.

UNIT - V

Performance of Spread Spectrum Systems in Jamming Environments: Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding. Performance of Spread Spectrum Systems with Forward Error Correction: Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding and Bit-Error Rate.

TEXT BOOKS:

1. Rodger E Ziemer, Roger L. Peterson and David E Borth - –Introduction to Spread Spectrum Communication- Pearson, 1st Edition, 1995.

2. Mosa Ali Abu-Rgheff – ―Introduction to CDMA Wireless Communications.‖ Elsevier Publications, 2008.

REFERENCE BOOKS:

1. George R. Cooper, Clare D. Mc Gillem - ―Modern Communication and Spread Spectrum,‖ McGraw Hill, 1986.
2. Andrew j. Viterbi - ―CDMA: Principles of spread spectrum communication,‖ Pearson Education, 1st Edition, 1995

B. Tech VIII Semester	L	T	P	C
	3	0	0	3

18EC8T03-STATISTICAL SIGNAL PROCESSING
(Professional Elective – IV)

COURSE OBJECTIVES

1. Introduce graduate students to the mathematical ideas that form the basis for modern statistically-based analysis of signals and systems.
2. To study the mathematical background of signal detection and estimation.
3. To study and use classical and Bayesian approaches to formulate problems.
4. To study signal detection and parameter estimation from noisy signals.
5. To study filtering methods for parameter estimation.

COURSE OUTCOMES:

1. Generalize the properties of statistical models in the analysis of signals using Stochastic processes.
2. Differentiate the prominence of various spectral estimation techniques for Achieving higher resolution in the estimation of power spectral density.
3. Outline various parametric estimation methods to accomplish the signal modeling even at higher order statistics.
4. Design and development of optimum filters using classical and adaptive algorithms.
5. Extrapolate the importance of least squares techniques and decomposition methods in analyzing the signal estimations.

Unit-1:

Review of random variables: Distribution and density functions, moments, independent, uncorrelated and orthogonal random variables; Vector-space representation of Random variables, Schwarz Inequality Orthogonality principle in estimation, Central Limit theorem, Random processes, wide-sense stationary processes, autocorrelation and auto covariance functions, Spectral representation of random signals, Wiener Khinchin theorem Properties of power spectral density, Gaussian Process and White noise process. Random signal modeling: MA(q), AR(p) , ARMA(p, q) models.

Unit-II

Parameter Estimation: Theory Principle of estimation and applications, Properties of estimates, unbiased and consistent estimators, Minimum Variance Unbiased Estimates (MVUE), Cramer Rao bound, Efficient estimators; Criteria of estimation: the methods of maximum likelihood and its properties; Bayesian estimation: Mean square error and MMSE, Mean Absolute error, Hit and Miss cost function and MAP estimation.

Unit-III

Estimation of signal in presence of white Gaussian Noise: Linear Minimum Mean-Square Error (LMMSE) Filtering: Wiener Hoff Equation, FIR Wiener filter, Causal IIR Wiener filter, Noncausal IIR Wiener filter, Linear Prediction of Signals, Forward and Backward Predictions, Levinson Durbin Algorithm, Lattice filter realization of prediction error filters.

Unit-IV

Adaptive Filtering: Principle and Application, Steepest Descent Algorithm Convergence characteristics; LMS algorithm, convergence, excess mean square error, Leaky LMS algorithm; Application of Adaptive filters; RLS algorithm, derivation, Matrix inversion Lemma, Initialization, tracking of nonstationary.

Unit-V

Kalman filtering: State-space model and the optimal state estimation problem, discrete Kalman filter, continuous- time Kalman filter, extended Kalman filter.

TEXT BOOKS

1.Discrete Random Signals and Statistical Signal Processing, By Charles W. Therrien, Prentice Hall Signal Processing Series

REFERENCE TEXT BOOK

1.M. H. Hayes, Statistical Digital Signal Processing and Modeling, John Wiley & Sons, Inc.,

2.D.G. Manolakis, V.K. Ingle and S.M. Kogon: Statistical and Adaptive Signal Processing, McGraw Hill, 2000. 3.

SIMULATION TEXT BOOKS

1.Statistical Digital Signal Processing and Modeling by Monson Hayes, John Wiley & Sons, Inc.,

2.J. G. Proakis et. al., Algorithms for Statistical Signal Processing, Pearson Education, 2002.

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T04-Electronic Measurements & Instrumentation

(Professional Elective – IV)

COURSE OBJECTIVES

1. Explain basic concepts and definitions in measurement.
2. Describe the bridge configurations and their applications.
3. Elaborate discussion about the importance of signal generators and analyzers in Measurement.
4. To introduce monitor, analyze and control any physical system.
5. To understand how different types of meters‘ work and their construction

COURSE OUTCOMES:

1. Recognize the evolution and history of units and standards in Measurements.
2. Identify the various parameters that are measurable in electronic instrumentation.
3. Employ appropriate instruments to measure given sets of parameters.
4. Practice the construction of testing and measuring set up for electronic systems.
5. To have a deep understanding about instrumentation concepts which can be applied to Control systems.

UNIT I

Performance characteristics of instruments, Static characteristics- Accuracy, Resolution, Precision, Expected value, Error, Sensitivity, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. Errors in Measurement. DC Voltmeters- Multi range, Range extension, AC voltmeters- multi range, range extension, Thermocouple type RF ammeter, Ohmmeters series type, Mustimeter for Voltage, Current and resistance measurements.

UNIT II

Signal Generator- fixed and variable, AF oscillators, AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform Generators. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT III

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, standard specifications of CRO, CRO probes- Active & Passive, Lissajous method of frequency measurement, Dual trace oscilloscope, Sampling oscilloscope, Storage oscilloscope, Digital Storage oscilloscope.

UNIT IV

Measurement of Resistance-Wheat stone bridge. Kelvin‘s bridge, Kelvin‘s Double bridge**,** AC Bridges Measurement of Inductance- Maxwell‘s bridge, Anderson bridge, Hay‘s bridge. Measurement of Capacitance -Schering Bridge. Wien Bridge, Errors and precautions in using AC bridges. Q-meter.

UNIT V

Data Acquisition Systems, Transducers- Types of transducers, Resistance, Capacitance, inductance, LVDT, Strain gauges, Piezo Electric transducers, Thermocouples, Thermistors, Sensistors. Measurement of physical parameters - force, pressure, velocity, humidity and displacement.

TEXTBOOKS:

1. Electronic Instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 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.Witte, Pearson Education, 2nd Edition, 2004.

B. Tech VIII Semester	L	T	P	C
	3	0	0	3

18EC8T05-Operating Systems

OPEN ELECTIVE IV

COURSE OBJECTIVES

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

1. Understand the functionalities of an operating system and Evaluate different CPU scheduling algorithms.
2. Apply synchronization to cooperating processes and handle the deadlocks
3. Learn various management techniques for efficient utilization of system memory.
4. Understand and analyze theory and implementation of files and Evaluate different disk scheduling algorithms.
5. Analyze the functionalities in various operating systems.

UNIT I

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

Process Management – Process concept, the process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Inter process Communication, Scheduling- Basic Concepts, Scheduling Criteria, and Scheduling Algorithms.

UNIT-II:

Concurrency: Process Synchronization, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

UNIT-III:

Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

UNIT-IV:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT V:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management **Mass-storage structure** overview of Mass-storage structure, Disk scheduling, Device drivers **TEXT BOOKS:**

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.

REFERENCES:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education‖, 1996.

B. Tech VIII Semester	L	T	P	C
	3	0	0	3

18EC8T06-SOFT COMPUTING TECHNIQUES

OPEN ELECTIVE IV

COURSE OBJECTIVES:

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.
3. Understand Soft Computing concepts, technologies, and applications.
4. Understand the underlying principle of soft computing with its usage in various application.
5. Understand different soft computing tools to solve real life problems.

COURSE OUTCOMES:

Upon completion of the course, the student is expected to

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

UNIT –I

Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, and Knowledge representation - Expert systems.

UNIT –II

Artificial Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network.

UNIT-III

Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –IV

Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge

and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT –V

Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search techniques for solving optimization problems, Applications.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd.,
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994..

B. Tech VIII Semester	L	T	P	C
	3	0	0	3

18EC8T07- MECHATRONICS
OPEN ELECTIVE IV

COURSE OBJECTIVE The main objective of this course is to introduce the integrative nature of Mechatronics. To describe the basic programming, different components and devices of mechatronics systems**.**

COURSE OUTCOME:

Upon completion of this course, the students can able

1. Basic concepts of mechatronics
2. To design mechatronics system with the help of Microprocessor
3. To design PLC and other electrical and Electronics Circuits
4. To understand the concept of solid state Devices
5. To know Dynamic models & controllers

UNIT I

Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors.

UNIT II

Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes –Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontrollers – Block diagram

UNIT III

Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC, Basic programming in PLC.

UNIT IV

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT V

Dynamic models and analogies, System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trend.

TEXT BOOKS:

1. Bolton, –Mechatronics‖, Printice Hall, 2000

2. Ramesh S Gaonkar, –Microprocessor Architecture, Programming, and Applications with the 8085‖, 5th Edition, Prentice Hall, 2008.

REFERENCE BOOKS:

1. Mechatronics System Design / Devdas shetty/Richard/Thomson.

2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

B. Tech VIII Semester	L	T	P	C
	2	0	0	2

COURSE OBJECTIVES:

18EC8T08-DATA COMMUNICATION& NETWORKING
OPEN ELECTIVE-V

The objectives of this course are

1. To Focus on information sharing and networks.
2. To Introduce flow of data, categories of network, different topologies.
3. To Focus on different coding schemes.
4. Brief the students regarding protocols and standards.
5. To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices, etc.

COURSE OUTCOMES:

1. On successful completion of the course, the student will be having the basic knowledge of data sharing, transmission media and their protocols.
2. Student will have the basic knowledge of computer networks.
3. To Focus on information sharing and networks.
4. To Introduce flow of data, categories of network, different topologies.
5. To Focus on different coding schemes

UNIT-1

Introduction to data communication and networking: Why study data communication? Data Communication, Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works.

Study of OSI and TCP/IP protocol suit: The Model,Functions of the layers,TCP/IP Protocol Suites

UNIT-2

Study of Signals: Analog and Digital, Periodic and Aperiodic Signals, Analog Signals, Time and Frequency Domains, Composite Signals, Digital Signals.

Study of Digital transmission: Digital to Digital Conversion, Analog to Digital Conversion.

UNIT-3

Study of Analog transmission: Digital to Analog Conversion, Analog to Analog Conversion.

Study of Multiplexing: Many to one/one to Many, Frequency division Multiplexing, Wage division Multiplexing, Time division Multiplexing, Multiplexing applications.

UNIT-4

Types of transmission media: Guided Media, Unguided Media, Transmission Impairments, Performance Wavelength, Shannon Capacity, Media Comparison, PSTN, Switching.

Error Detection and Correction: Types of Errors, Detection, Parity Check, Vertical Redundancy Check Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, Error Correction.

UNIT-5

Study of DTE-DCE in brief: Digital data transmission, DTE-DCE Interface, Modems, 56K Modems, Cable Modems.

Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges, Switches, Routers, Gateways Routers, Routing Algorithms, Distance Vector Routing, Link State Routing.

Text Books:

1. Data communication & Networking by Bahrouz Forouzan.
2. Computer Networks by Andrew S. Tanenbaum

Reference Books:

1. Data and Computer Communications by William Stallings
2. Kleinrock, Leonard. *Queueing Systems, Vol 1: Theory*. New York, NY: Wiley J., 1975. ISBN: 0471491101.

B. Tech VIII Semeste	L	T	P	C
	2	0	0	2

18EC8T09- Renewable Energy sources

OPEN ELECTIVE-V

COURSE OBJECTIVE:

1. introduces basics of solar energy like solar radiation, collection, storage and application.
2. introduces the wind energy, biomass energy, geothermal energy and ocean energy

COURSE OUTCOMES:

1. Understand the basics of various renewable energy systems.
2. Understand the concepts of solar energy and wind energy.
3. Understand the concepts of bio-energy
4. Understand the concepts OTEC, geothermal and Ocean Energy
5. Understand the concepts of Ocean Energy

UNIT-I

Introduction: Introduction to energy sources, reserves and estimates, global energy scenario, renewable energy - environment implications, global warming and climate change, limitations of conventional energy sources, classification of non-conventional energy sources - solar energy, wind energy, bio-energy, *Ocean Thermal Energy Conversion* (OTEC), tidal, geothermal and hydro.

UNIT-II

Solar Radiation , Solar Energy Collection & Photovoltaic Energy Conversion

environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface,

instruments for measuring solar radiation and sun shine, solar radiation

data. Flat plate and concentrating collectors, classification of

concentrating collectors

Solar cell fundamentals, solar cell classification, performance of solar cell- power from solar module.

UNIT-III

Wind energy: Wind energy and its application, types of wind mills and their characteristics, elementary design principles, wind energy conversation system, determination of torque coefficient, wind energy storage -applications - hybrid (wind & solar)systems.

UNIT-IV

Bio-energy: Biomass and its sources, energy plantation, production of fuel wood, bio-conversion processes, bio-gas, bio-diesel and ethanol production and utilization, thermo-chemical processes, biomass gasification, process, types of reactors, utilization of producer gas for thermal and electricity generation.

UNIT-V

Ocean thermal energy conversion, geothermal and Ocean Energy

open and closed *Ocean thermal energy conversion* cycles, geothermal energy sources,. Tidal energy, wave energy, data, technology options; small hydro turbines, power plant and environmental issues

Text Books:

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2006
2. Renewable Energy resources, Tiwari and Ghosal, Narosa,2005

Reference Books:

1. Renewable Energy Technologies by R. Ramesh, K. Uday Kumar, M. Anandakrishnan, Narosa Publishing House, 1997
2. Non-Conventional Energy Systems by K Mittal, A. H. Wheeler Publishing Company Limited, 01-Jan-1999.

B. Tech VIII Semester	L	T	P	C
	2	0	0	2

18EC8T10-Network Security & Cryptography

OPEN ELECTIVE-V

COURSE OBJECTIVES:

The following principles and practice of cryptography and network security are covered:

1. Classical systems, symmetric block ciphers (DES, AES, other symmetric ciphers)
2. Public-key cryptography (RSA, discrete logarithms)
3. Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
4. Email and web security
5. Security at the Transport Layer

COURSE OUTCOMES:

1. To be familiar with information security and a clear understanding of its importance.
2. To master protocols for security services
3. To be familiar with network security threats and countermeasures
4. To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)
5. To be familiar with Security at the Transport Layer

UNIT- I:

Introduction: Security Goals, Cryptographic Attacks, Services and Mechanisms Cipher Model, Substitution Techniques, Transportation Techniques.

UNIT- II:

Symmetric Key Cryptography: Traditional Block Cipher Structure, DES algorithm, AES algorithm, Other Ciphers- Blowfish, IDEA, Block Cipher Modes of Operations

UNIT- III:

Asymmetric Key Cryptography: Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, and Elliptic Curve Cryptography

UNIT- IV:

Data Integrity, Digital Signature Schemes & Key Management : Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature.

Security at application layer: PGP and S/MIME,

UNIT -V: Security at the Transport Layer: SSL and TLS **Security at the Network Layer:** IPSec

TEXT BOOKS:

1) Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, (3e), Mc Graw Hill.

2) Cryptography and Network Security, William Stallings, (6e) Pearson.

REFERENCE BOOKS:

1) Network Security and Cryptography, Bernard Meneges, Cengage Learning.

2) Everyday Cryptography, Keith M.Martin, Oxford.

B. Tech VIII Semester	L	T	P	C
	0	0	16	8

18EC8P11-PROJECTS

A student is required to undertake a project work by using the knowledge acquired by him/her during the course of study. The student is expected to design and build a complete system or sub-system on an area of interest. A project work shall be carried out by a batch of students not exceeding 5 members, under a faculty supervisor.

i. **Continuous Internal Evaluation:** For Major Project, there shall be continuous internal evaluation during the semester for 30 marks. The continuous internal evaluation for the Major Project shall be on the basis of day to day assessment by the supervisor and two reviews conducted by the Project Review Committee (PRC). The PRC consists of Head of the Department, Program Coordinator and two Senior Faculty members of department. The distribution of marks is given in the table below:

Table 6: Distribution of Marks (CIE)

S. No.	Criteria	Marks
1	Day to Day Assessment	10
2	Review-1	10
3	Review-2	10

ii. **Semester-end Examination:** A batch of students shall submit a duly-certified Project Report to the department on a specified time. They shall make a presentation on the Project work before a three-member committee consisting of External Examiner, Internal Examiner (HOD) and the Project Supervisor

B. Tech VIII Semester	L	T	P	C
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18EC8L12-Comprehensive Viva-Voice

A student is required to undertake Comprehensive Viva-Voice To enhance knowledge acquired by him/her during the course of study. The student is expected to present his knowledge in the field of Electronics and communication Engineering and build a complete interest in course. A Comprehensive Viva-Voice shall be carried out by a individual student. They shall attend before a three-member committee consisting of Head of the Department and Two Senior Faculty members Also the Supervisor