KAKATIYA UNIVERSITY
BACHELOR OF TECHNOLOGY First Year
Structure of Curriculum-Common to All Branches

Semester-I (First Year)

Branch/Course Common to all branches of UG Engineering & Technology

Sl. No.	Category/ Code	Course Title	Internal Marks	External Marks	Total marks	Lecture	Tutorial	Practical	No of Credits
1	Basic Sciences Course /BSC 101	Physics	30	70	175	3	1	-	5.5
		Lab.	25	30		-	-	3	
2	Basic Sciences Course /BSC 103	Mathematics-I	30	70	100	3	1	0	4
3	Engineering Science Courses/ESC101	Basic Electrical Engineering	30	70	175	3	1	-	5
		Lab.	25	50				2	
4	Engineering Science Courses/ESC102	Engineering Graphics & Design	30	70	175	1	0	4	3
		Lab.	25	50					
5	Engineering Science Courses	Engineering Mechanics	30	70	100	3	1	0	4
		Total Credits							21.5

In order to balance the load of the some of the subjects which are made in groups (Physics/Chemistry, Engineering Graphics & Design/ Workshop and Manufacturing Practices, Programming for Problem Solving/Engineering Mechanics), the half of the branches of B.Tech course offer one subject of group in odd semester and other half of the branches of B.Tech course offer another subject of same group in odd semester. In the even semester the subjects of the group will be exchanged

MANDATORY INDUCTION PROGRAM

BEFORE BEGINNING OF FIRST SEMESTER

3 Weeks Duration

- Physical Activity
- Creative Arts
- Universal Human Values
- Literay
- Proficiency Modules
- Lectures by Eminent People
- Visits to Local Areas
- Familiarization to Dept./Branch & Innovations

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

PHYSICS
(Theory)

Course code	BSC101				
Category	Basic Science Course				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Internal marks = 30
	3	**1**	**-**	**4**	External Marks = 70

Detailed contents:

UNIT-I

SCALARS AND VECTORS

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates.***(8 lectures)***

UNIT II

POTENTIAL ENERGY FUNCTION

Potential energy function; F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler's problem; Application: Satellite manocurves.***(7 lectures)***

SIMPLE HARMONIC MOTION

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.***(6 lectures)***

UNIT- III

RIGID BODY

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.***(5 lectures)***

UNIT-IV

ELECTROSTATICS IN VACUUM

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Faraday's cage and coffee-ringeffect.Boundary conditions of electric field and electrostatic potential,method of images,energy of a charge distribution and its expression in terms of electric field ***(8 lectures)***

MAGNETOSTATICS

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities***.(6 lectures)***

UNIT-V

FARADAY'S LAWS

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law.***(3 lectures)***

DISPLACEMENT CURRENT, MAGNETIC FIELD DUE TO TIME DEPENDENT ELECTRIC FIELD AND MAXWELL'S EQUATIONS

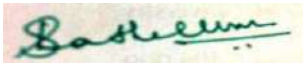
Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time-dependent electric field; calculating magnetic field due to changing electric fields in quasi-static approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. ***(5 lectures)***

Suggested Text Books

(i) Introduction to Mechanics — MK Verma
(ii) Introduction to Electrodynamics---David Griffiths
(iii) Engineering Mechanics, 2nd ed. — MK Harbola

Suggested Reference Books:

(i) Halliday and Resnick, Physics
(ii) W. Saslow, Electricity, magnetism and light
(iii) An Introduction to Mechanics — D Kleppner& R Kolenkow
(iv) Principles of Mechanics — JL Synge & BA Griffiths
(v) Mechanics — JP Den Hartog
(vi) Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
(vii) Mechanical Vibrations — JP Den Hartog
(viii) Theory of Vibrations with Applications — WT Thomson



Dr. C.J. Sreelatha
Chairperson Board of Studies in Physics,KU,Wgl
Date:

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

PHYSICS
(Lab.)

Course code	BSC101				
Category	Basic Science Course				
Course title	**Physics-Practical**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Internal marks = 25
	-	**-**	**3**	**1.5**	External Marks = 50

APPLIED PHYSICS LAB

Choice of experiments from the following:

1. Coupled oscillators.

2. Experiment on moment of inertia measurement.

3. Experiments with gyroscope.

4. Resonance phenomena in mechanical oscillators.

5. LC circuit and CR circuit.

6. Resonance phenomena in LCR circuits.

7. Magnetic'field from Helmholtz coil.

8. Measurement of Lorentz force in a vacuum tube.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

MATHEMATICS -1

MAXIMUM HOURS:48

Unit 1: Sequences and Series

Sequences , series, general properties of series , series of positive terms, comparison test, integral test, ratio test, Cauchy's root test, D' Alembert's ratio test. Fourier series, Euler's formula, condition for Fourier expansion, Even and odd functions.

(Sections 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 10.1, 10.2, 10.3, 10.6 of Text Book)

Unit 2: Calculus

Fundamental theorems (without proofs) Rolle's Theorem (algebraic and geometrical interpretation, geometrical proof), Legrange's mean value theorem, Cauchy's mean value theorem, Taylors theorem, Maclaurin's series. Asymptote's parallel to axis, curve tracing (simple curves only), radius of curvature for cartesian curves.

(Sections 4.3, 4.10, 4.11, 4.16, 4.17, 9.7 of Text Book)

Unit 3: Multivariable Differential Calculus

Functions of two or more variables, partial derivatives, total derivatives, change of variables, Jacobians, Taylor's theorem (without proof), errors and approximations, maxima and minimum of functions of two variable. Scalar and vector point functions, gradient, divergence, curl, physical interpretation.

(Sections 5.1, 5.2, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 8.5, 8.6 of Text Book)

Unit 4: Multivariable Integral Calculus

Double integrals, change of order of integration , triple integrals, change of variables, beta and gamma function, line integrals, surface integrals, volume integrals, Greens, Gauss and Stokes theorems (without proof) irrotational fields, solenoidal fields.

(7.1, 7.2, 7.5, 7.7, 7.14, 7.15, 7.16, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16, 8.18 of Text Book)

Unit 5: Differential Equations

Differential equations of first order, formation of differential equations. variable separable form, Bernouli's equation, exact equations, physical applications (Newton's law of cooling, rate of decay) linear differential equations, applications of linear differential equations (simple harmonic motion, oscillating electric circuits). (Sections 11.1, 11.3, 11.4, 11.6, 11.10, 11.11, 12.6, 12,8, 14.1, 14.2, 14.5 of Text Book)

Text Book: B.S. Grewal et.al, Higher Engineering Mathematics, 43rd Edition, Khanna Publicationns.

Reference: Erwin Kreyszig, Aadvanced Engineering Mathematics, 8th Edition, John Wiley & Sons.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

BASIC ELECTRICAL ENGINEERING

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks:30
3	1	0	4	External Marks:70

UNIT – I (7+3)

DC circuits: Introduction, network elements (R, L and C), electric power, electrical energy, Ohm's law, Kirchhoff's laws, resistances in series-voltage divider rule; resistances in parallel-current divider rule, series & parallel circuits, mesh analysis and nodal analysis.

DC network theorems: Introduction, superposition theorem, Thevenin's theorem, Norton's theorem and maximum power transfer theorem. Time-domain analysis of first-order RL and RC circuits.

UNIT – II (7+3)

1-ϕ AC circuits: Phasor representation of sinusoidal quantities, average and R.M.S values of sinusoidal wave form, Form Factor, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), series resonance.

3-ϕ AC circuits: Production of 3-ϕ voltages, voltage & current relationships of line and phase values for balanced star and delta connections.

UNIT – III (7+3)

Transformers : Magnetic materials, BH characteristics, Construction, principle of operation & applications of 1-ϕ transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer and 3-ϕ transformer connections.

Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Significance of torque-slip characteristic, starting and speed control of induction motor and Applications.

Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications.

UNIT – IV (7+3)

DC Generators : Constructional features, operating principle, EMF equation, types of DC Generators, magnetization characteristics of DC shunt generator and Applications.

DC Motors: Principle of Operation, Torque Equations, Operating Characteristics of DC Motor, Speed Control Methods and Applications.

Synchronous Generators : Construction and principle of operation of Synchronous generators.

UNIT –V (6+2)

Power Converters : DC-DC buck and boost converters, duty ratio control. Single-phase voltage source inverters and sinusoidal modulation.

Electrical Installaiton: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text Books:

1. B.L.Thereja, A.K.Thereja, "Electrical Technology Vol. I & II"**,** *S.Chand & Company Ltd*, edn , 2005.
2. Edward Hughes, "Electrical & Electronics Technology", *Pearson Education,* 10/e., 2010.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", *Tata McGraw Hill*, edn , 2010.

Reference Books:

1. K. Uma Rao, "Basic Electrical Engineering", *Pearson Education,* edn, 2011.
2. Chakravarthy A, Sudhipanath and Chandan Kumar, "Basic Electrical Engineering", *Tata McGraw Hill Ltd*, edn, 2009.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

BASIC ELECTRICAL ENGINEERING LAB

Class: I/IV B.Tech., I Semester **Branch: Common to all**

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks:25
0	0	2	1	External Marks:50

1. Verification of KVL, KCL
2. Transient response of R-L, R-C, R-L-C circuits with DC excitation
3. Verification of Thevenin's Theorem
4. Verification of Norton's Theorem
5. Verification of Maximum Power Transfer Theorem
6. Determination of internal resistance and internal inductance of choke coil
7. Resonance in RLC series circuit
8. Speed control of DC Shunt motor
9. Open Circuit and Short Circuit Test on single phase Transformer.
10. Performance characteristics of 3 phase squirrel cage induction motor
11. Demonstration of components of LT switchgear

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

ENGINEERING GRAPHICS

Teaching Scheme				Examination Scheme
L	T	P	c	Internal Evaluation -30
1	0	4	3	External Evaluation -70

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their ignificance, Usage of Drawing Instruments, Lettering. Conic Sections including the Rectangular Hyperbola – General method only Cycloid,Epicycloid and Hypocycloid, Scales – Plain, Diagonal and vernier.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

UNIT – IV

Isometric Projections: Principles of Isometric Projection – Isometric Scale , Isometric Views ,Conventions , Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions.

UNIT – V

Development of Surfaces: Right Regular Solids – Prism, Cylinder, Pyramid and Cone.

Introduction to CAD: (For Internal Evaluation Weightage only)

Introduction to Auto CAD Commands, Draw Tools,Modify Tools, Text, Dimension Properties, DIMENSION, PROPERTIES tool bar, Standard Tool bar, LAYERS.

TEXTBOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing / M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: Syllabus must be complete in 48 theory hours, however theory hours may be converted in to equal practical hours as per credits

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – I
(Common to all branches)

ENGINEERING MECHANICS

Teaching Scheme :					Examination Scheme :	
L	**T**	**P**	**C**		Internal Evaluation :	30 marks
3	1	-	4		End Semester Exam :	70 marks

Course Learning Objectives (LOs):

LO1: develop concept of force, reactions, principles of force and their application on engineering structures and machines
LO2: introduce various kinds of statically determinate pin jointed structures and methods of analysing the trusses
LO3: understand the importance of geometric centre, cross sectional areas of plane lamina and moment of inertia
LO4: understand the behavior of particles in motion subjected to system of forces.

UNIT – I (6+2)

Laws of Mechanics: Parallelogram law of forces, triangle law of forces, Newton's law of gravitation, law of superposition and transmissibility of forces.

Force Systems: Types of forces, co-planar, concurrent and parallel forces, moment and couple, free body diagram, resultant of force systems, resolution of forces, composition of forces, equilibrium equations of forces, Lami's theorem, Varignon's theorem, moment equilibrium equations, types of supports, beams and loadings, statically determinate structures, resultant and equilibrium of general force system.

UNIT –II (8+2)

Friction: Introduction, classification, laws of friction, coefficient of friction, angle of friction, ladder friction and wedge friction.

Plane Trusses: Rigid truss, stability and determinacy conditions, basic assumptions for a perfect truss, analysis of trusses by method of joints and method of sections of a cantilever and simply supported statically determinate pin-jointed trusses.

UNIT– III (8+2)

Centroid: Centroid of one dimensional figures, centroid of simple figures from first principles, centroid of composite sections.

Moment of Inertia: Moment of inertia of plane sections from first principles, theorems of moment of inertia – parallel axis theorem and perpendicular axis theorem, moment of inertia of standard sections and composite sections.

UNIT - IV (8+2)

Kinematics: Introduction to dynamics, rectilinear motion of a particle – displacement, velocity and acceleration, motion with uniform acceleration and motion with variable acceleration, curvilinear motion- rectangular components, components, acceleration of normal and tangential acceleration, projectile motion.

UNIT - V (8+2)

Kinetics: Rectilinear motion-equations of rectilinear motion, equations of dynamic equilibrium, D'Alembert's principle, curvilinear motion-equations of motion in rectangular components, tangential and normal components, equations of dynamic equilibrium, applications of work-energy, impulse –momentum principles of rectilinear motion and curvilinear motion.

Text Books:

- Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers,* New Delhi, 14th edn., 2014.

Reference Books:

- Timoshenko S., Young D.H., Rao J.V., and Sukumar Pati, "Engineering Mechanics in SI units", *McGraw Hill Education Pvt. Ltd.,* New Delhi, 5th edn., 2013.

- Bhavikatti S.S., "Engineering Mechanics", *New Age International,* New Delhi, 4th edn., 2013 (reprint).

- Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press,* 9th edn., 2013.

- Vijay HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" HYPERLINK "https://www.alibris.com/search/books/author/K-Vijay-Kumar-Reddy?aid=6776440" Kumar Reddy K., Suresh Kumar J. "Singer's Engineering Mechanics Statics and Dynamics" *BS Publications / BSP Books*, 3rd edn. (SI Units), 8th Reprint, 2014

KAKATIYA UNIVERSITY
BACHELOR OF TECHNOLOGY
FIRST YEAR SYLLABUS
Structure of Curriculum-Common to All Branches

Semester –II (First Year)

Branch/Course: Common to all branches of UG Engineering & Technology

Sl. No.	Category/ Code	Course Title	Internal Marks	External Marks	Total Marks	Lecture	Tutorial	Practical	No of Credits
1	Basic Sciences Course /BSC 102	Chemistry	30	70	175	3	1	-	5.5
		Lab.	25	50		-	-	3	
2	Basic Sciences Course /BSC 104	Mathematics-II	30	70	100	3	1	0	4
3	Engineering Science Courses/ESC103	Programming for Problem Solving	30	70	175	3	0	-	5
		Lab.	25	50				4	
4	Engineering Science Courses/ESC104	Workshop and Manufacturing Practices	30	70	175	1	0	-	3
		Lab.	25	50		-	-	4	
5	Humanities and Social Sciences including Management courses/HSMC101	English	30	70	175	2	0	-	3
		Lab.	25	50				2	
		Total Credits							20.5

In order to balance the load of the some of the subjects which are made in groups (Physics/Chemistry, Engineering Graphics & Design/ Workshop and Manufacturing Practices, Programming for Problem Solving/Engineering Mechanics), the half of the branches of B.Tech course offer one subject of group in odd semester and other half of the branches of B.Tech course offer another subject of same group in odd semester. In the even semester the subjects of the group will be exchanged

MANDATORY INDUCTION PROGRAM

BEFORE BEGINNING OF FIRST SEMESTER

3 Weeks Duration

- Physical Activity
- Creative Arts
- Universal Human Values
- Literay
- Proficiency Modules
- Lectures by Eminent People
- Visits to Local Areas
- Familiarization to Dept./Branch & Innovations

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

CHEMISTRY
(Theory)

***Class*: B.Tech. I Year** | ***Internal Marks*: 30**
***Lectures*: 3 Hrs/Week** | ***External Marks*: 70**

UNIT-I

1. ELECTROCHEMISTRY **(08 Hrs)**

Electrode potential, standard electrode potential, Nernst equation (No derivation); Electro chemical series. Types of electrodes - Hydrogen, Quinhydrone, Calomel, and Ion selective electrode (Glass electrode); Galvanic cell, EMF; Determination of pH using Quinhydrone and Glass electrodes; Potentiometric titrations (Acid-base and Redox). Numerical problems.

Batteries: Primary and secondary batteries - Zinc-Carbon battery & Lead-acid battery.

UNIT-II

1. **CORROSION** **(07Hrs)**

Introduction – causes and effects of corrosion. Dry and wet corrosion. Electrochemical theory of corrosion. Galvanic and differential aeration corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic protection. Surface coatings – metallic coatings – methods of application.

2. **WATER ANALYSIS AND TREATMENT** **(07Hrs)**

Hardness of water - Causes of hardness - Types of hardness: temporary and permanent – expression and units of hardness. Determination of hardness of water using EDTA method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Brief review of methods of softening of water - Zeolite process and Ion-exchange process. Desalination of water- Reverse osmosis.

UNIT-III

1 **Organic reactions, synthesis of a drug molecule & Stereochemistry** **(11 Hrs)**

Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N^1, S_N^2 reactions. *Electrophilic and Nucleophilic addition reactions*: Addition of HBr to propene. Markownikoff's and anti-Markownikoff's additions; Grignard additions on carbonyl compounds; *Elimination reactions*: Dehydrohalogenation of alkylhalides. Saytzeff rule. *Oxidation reactions*: Oxidation of alcohols using $KMnO_4$ and chromic acid. *Reduction reactions*: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$. Hydroboration of olefins. *Synthesis and applications of commonly used drug molecules*: Aspirin and Paracetamol.

Stereochemistry: Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n- Butane.

UNIT-IV

1. **Molecular structure and Theories of Bonding**: **(08 Hrs)**

   Atomic and Molecular orbitals: Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules. Molecular orbital energy level diagrams (MOED) of N_2, O_2 and F_2 molecules.

   Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT-V

2 **Spectroscopic techniques and applications**: **(07Hrs)**

Interaction of radiation with matter, spectrum of electromagnetic radiation, Principles of spectroscopy, selection rules and applications of Electronic spectroscopy, Vibrational and Rotational spectroscopy of diatomic molecules. Applications. Numerical problems.

TEXT BOOKS:

1. Text Book of Physical Chemistry by *PL Soni and OP Dharmarha*, Sulthan Chand & Sons.
2. Engineering Chemistry by *PC Jain & M Jain*, Dhanapathi Rai publishing Co.
3. Text Book of Engineering Chemistry by *Shashi Chawla*, Dhanapathi Rai publishing Co.

REFERENCE BOOKS:

1. Principles of Physical Chemistry by *Maron and Prutton*.
2. Applied Chemistry- A Text Book of Engineers & Technologists by *HD Gesser*.
3. Chemistry in Engineering & Technology by *Kuriacose and Rajaram.*
4. Text Book of Engineering Chemistry by *CP Murthy, Agarwal and A Naidu.*
5. A Text Book of Engineering Chemistry by *SS Dara.*
6. Engineering Chemistry by *RP Mani, KN Mishra and B Ramadevi.*
7. Engineering Chemistry by *OP Agarwal.*
8. Fundamentals of Molecular Spectroscopy, by C.N. Banwell

Details about Question Paper of External Examination (Model)

Time: **3 Hrs** Marks: **70**

The question paper consists of TWO sections. (section-A & section-B)

SECTION-A (10X01=10 Marks)

Attempt **all** Questions. Each Question carries 01 Mark.

Q I: About **10** short answer type Questions from all the units. (02 Questions from each unit)

SECTION-B (05X12=60 Marks)

Attempt any **five** (**05)** Questions. Each Question carries 12 Marks.

Q II to **Q VIII**: Should be given **one** question from each unit and set to **07** Questions.

KAKATIYA UNIVERSITY
B. Tech. First Year
SEMESTER – II
(Common to all branches)

CHEMISTRY LABORATORY

(Common to all branches)

(Credits: 1.5)

***Class*: B.Tech. I Year** ***Internal Marks*: 25**

***Practical*: 3 Hrs/week** ***External Marks*: 50**

LIST OF EXPERIMENTS:

1. Determination of Hardness (Total, Temparary and Permanent) of water using EDTA method.
2. Determination of chloride content of water by Argentometry.
3. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.
4. Colorimetric analysis-verification of Lambert-Beer's law using $KMnO_4$ solution.
5. Conductometric titration of HCl with NaOH
6. Conductometric titration of CH_3COOH with NaOH
7. Potentiometric titration of HCl with NaOH
8. Potentiometric titration of Fe^{2+} with $KMnO_4$
9. Verification of Freundlich adsorption isotherm-adsorption of acetic acid on charcoal.
10. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
11. Determination of surface tension of a given liquid using stalagmometer.
12. Synthesis of Urea-Formaldehyde resin polymer / Synthesis of Aspirin.

TEXT BOOKS:

1. *Vogel's* Inorganic Quantitative analysis (2007).
2. College Practical Chemistry by *VK Ahluwalia* (2007)
3. Senior Practical Physical Chemistry by *BD Khosla, A Gulati and VC Garg* (2001)
4. Practical Physical Chemistry by *B Vishwanathan, PS Raghavan.*
5. Text book on Experiments and calculations in Engineering chemistry – *S.S. Dara*
6. *Vogel*'s text book of practical organic chemistry *5th edition*

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

MATHEMATICS -2

(MAXIMUM HOURS: 48)

Unit 1: Integral Transforms

Laplace Transforms: Laplace transforms of elementary functions, properties, transform of derivatives, transform of integrals, multiplication by t, division by t, evaluation of integrals, inverse transforms, convolution theorem, and application to differential equations.

(21.1, 21.2, 21.3, 21.7, 21.8, 21.9, 21.10, 21.11, 21.12, 21.13, 21.14, 21.15 of Text Book)

Unit 2: Linear Algebra

Rank of a matrix, solution of linear system of equations, consistency of linear system of equations, linear independence vectors and linear dependence vectors, Eigen values and Eigen vectors, Caley Hamilton theorem, reduction to diagonal form, complex matrices, Hermition matrix and conjugate matrix.

(Sections 2.7(1), 2.9, 2.10, 2.12, 2.13, 2.14, 2.15, 2.16, 2.19 of Text Book)

Unit 3: Partial Differential Equations

Formation of partial differential equations, linear equations of first order, non-linear equations of first order, Charpit's method, homogenous equations with constant coefficients , applications (one dimensional wave equation, one dimensional heat flow, two dimensional heat flow).

(Sections 17.1, 17.2, 17.3, 17.5, 17.6, 17.7, 17.8, 18.1, 18.3, 18.4, 18.5, 18.6 of Text Book)

Unit 4: Complex Variable - Differentiation

Limit of complex functions, derivative of a complex function, analytic function, Cauchy-Reimann equations, Harmonic functions, applications to flow problems, some standard transformations.

(Sections 20.1, 20.2, 20.3, 20.4, 20.5, 20.6, 20.7, 20.8 of Text Book)

Unit 5: Complex Variables - Integration

Complex integration, Cauchy's theorem, Cauchy's integral formula, Caucly's inequality, Liouvile's theorem, Taylors series, Laurent's series, Singularities of function, residues, residue theorem, evaluation of real definite integrals (integration of trigonometric functions around unit circle, integral of functions around a semi-circle).

(Sections 20.12, 20.13, 20.14, 20.15(2,3), 20.16, 20.17, 20.18, 20.20(a, b) of Text Book)

Text Book: B.S. Grewal et.al. Higher Engineering Mathematics, 43rd Edition, Khanna Publicationns.

Reference: Erwin Kreyszig, Aadvanced Engineering Mathematics, 8th Edition , John Wiley & Sons.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

Programming for Problem Solving

Teaching Scheme				Examination Scheme
L	**T**	**P**	**C**	**Internal marks: 30**
3	**-**	**4**	**5**	**External marks:70**

UNIT-I: (6+2)

Introduction:
Block Diagram of Computer, Number system (Binary, Octal and Hexa decimal), Input-Output devices.
Operating system definition goals and services, compliers and interpreter, Problem solving steps, Algorithms, Flow chart, Types of programming languages, Introduction to C –language.

Unit-II: (7+3)

Fundamentals of C-language:
Token of C-languages: Identifiers, key words, Constants, Data types, Declaration and initialization statements, compound statements, Operators, Expressions and evaluation, Type conversion, Input-output statements, Structure of C-program.

Unit-III: (7+3)

Control structures/statements:
Decision statements: if, if-else, if-else-if, nested-if and switch-case
Iterative statements: while, do-while and for
Unconditional branching statements: break, continue, goto and exit .

Unit-IV: (7+3)

Arrays and Pointers:
Arrays: Definition of Arrays, 1-Dimensional arrays, 2-Dimensional arrays and multi dimensional arrays, Strings, String handling functions.
Pointers: Definition and declaration of pointer, operation on pointers, pointer and arrays, pointer to functions

Unit-V: (7+3)

Structure-Union: Definition and syntax of structure, union, Comparison between union & structure, nested structures, array of structures, pointer to structures.
Functions: Definition, function prototype, library and user define functions, types of functions, storage classes, parameter passing methods (call by value and call by address), recursion and macros.
Files: Introduction, File modes, Input and out operations on files.

TEXT BOOKS:

1. Let Us C, 14th Edition, Yashavant P. Kanetkar, BPB Publications, ISBN 13: 9788183331630.
   Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.

2. C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, ISBN 0-13-110362-8

TEXT/REFERENCE BOOKS:

1. Programming in ANSI C, SIXTH edition, E.Balaguru Swamy, Tata McGraw Hill Pvt Ltd, ISBN-10: 1259004619.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
3. Programming in C. Second Edition, Reema Thareja, ISBN: 9780199456147, Oxford University Press.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

PROGRAMMING FOR PROBLEM SOLVING LAB USING C

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
-	-	4	2	External Marks: 50

LIST OF EXPERIMENTS

1. Programs using input output functions
2. Programs for declaration statement, initialization statement, data type conversions
3. Programs using all operators in C
4. Programs using conditional control structures; if, if-else, nested if, if else if ladder and switch
5. Programs using loop control structures: while, do-while, for,
6. Programs using unconditional statements : break, continue, goto
7. Programs on one dimensional array and two dimensional arrays
8. Programs using functions: different types, parameter passing using call-by-value, call-by-reference
9. Programs using recursion
10. Programs using strings and sharing handling functions
11. Programs using pointers, pointers to arrays, pointer to functions
12. Programs using structures and unions

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

ENGINEERING WORKSHOP

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry –

1. Study of Carpentry Tools, Equipment and different joints.
2. Practice of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint

II. Fitting –

1. Preparation of square-Fit as per the given specifications.
2. Preparation of Dovetail Fit as per the given specifications.
3. Preparation of Semi-circular as per the given specifications.

III. Foundry –

1. Introduction to foundry, Patterns, pattern allowances, ingredients of moulding sand and melting furnaces. Foundry tools and their purposes
2. Demo of mould preparation
3. Practice – Preparation of mould by using split pattern.

IV. Welding Practice –

1. Introduction, Study of Tools and welding Equipment (Gas and Arc welding)
2. Selection of welding electrode and current, Bead practice.
3. Practice of Butt Joint, Lap Joint. VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)

V. Plumbing:

1. Practice of Internal threading, external threading, pipe bending, pipe fitting.
2. Pipes with coupling for same diameter and with reducer for different diameters.
3. Practice of T-fitting, Y-fitting, Gate valves fitting.

KAKATIYA UNIVERSITY
B.Tech. First Year
SEMESTER – II
(Common to all branches)

English

Course Code	HSMC 101				
Category	Humanities and Social Sciences Including Management Courses				
Course Title	**English**				
Scheme and Credits	L	T	P	Credits	Semester-II
	2	0	2	3	
Exam Pattern	Internal 30 Marks and External: 70 Marks				
Course Completion	Max 48 Hours				

Unit 1. Vocabulary Building

1.1 The concept of Word Formation
1.2 Root words from foreign languages and their use in English
1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
1.4 Synonyms, antonyms, and standard abbreviations.

Unit 2. Basic Writing Skills

2.1 Sentence Structures
2.2 Use of phrases and clauses in sentences
2.3 Importance of proper punctuation
2.4 Creating coherence
2.5 Organizing principles of paragraphs in documents
2.6 Techniques for writing precisely

Unit 3. Identifying Common Errors in Writing

3.1 Subject-verb agreement
3.2 Noun-pronoun agreement
3.3 Misplaced modifiers
3.4 Articles
3.5 Prepositions
3.6 Redundancies
3.7 Clichés

Unit 4. Nature and Style of sensible Writing

4.1 Describing
4.2 Defining
4.3 Classifying
4.4 Providing examples or evidence
4.5 Writing introduction and conclusion

Unit 5. Writing Practices

5.1 Comprehension
5.2 Précis Writing
5.3 Essay Writing

PRACTICALS/LAB: Oral Communication
(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

Prescribed Text Book
Language and Life: A Skills Approach, Orient Blackswan 2018

Suggested Readings:
(i) Practical English Usage. Michael Swan. OUP. 1995.
(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007
(iii) On Writing Well. William Zinsser. Harper Resource Book. 2001
(iv) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE)

III - SEMESTER

Sl. No.	Course Code	Course Title	Scheme of Instruction			Credits
			L	T	P	
1.	BSC 105	Mathematics – III	3	0	0	3
2.	HS 901 MB	Managerial Economics and Accountancy	3	0	0	3
3.	PC 301 EC	Electronics Devices and Circuits	3	1	0	4
4.	PC 302 EC	Digital System Design	3	1	0	4
5.	PC 303 EC	Signals and Systems	3	1	0	4
6.	PC 304 EC	Network Analysis and Synthesis	3	0	0	3
7.	MC-220	Constitution of Indian	2	0	0	0
8.	PC 351 EC	Electronics Devices and Circuits Laboratory	0	0	3	1.5
9.	PC 352 EC	Digital System Design Laboratory	0	0	3	1.5
Total			**18**	**3**	**6**	**24**

L : Lectures
T : Tutorials
P : Practical’s
CIE : Continuous Internal Evaluation
SEE : Semester End Examination
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
HS : Humanities and Social Sciences

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
BSC-105
Mathematics - III

Statistics, Probability, and Numerical Techniques

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Module1: Statistical Methods

Introduction, Collection of Data, Graphical Representation, Measures of Dispersion, Moments, Skewness, Kurtosis, Correlation, Coefficient of Correlation, Lines of Regression.
(Sections 25.1, 25.2, 25.3, 25.6, 25.9, 25.10, 25.11, 25.12, 25.13, 25.14 of Text Book)

Module2: Probability & Distributions

Probability, Addition Law of Probability, Independent Events, Baye's Theorem , Random Variable, Continuous Probability Distribution, Expectation, Moment Generating Function, Binomial Distribution , Poisson Distribution, Normal Distribution, Exponential Distribution. (Sections26.1,26.4,26.5,26.6,26.7,26.9,26.10,26.11,26.14,26.15,26.16,26.19(6) of Text Book)

Module3: Numerical Techniques-I

Solution of Algebraic and Transcendental Equations, Principle of Least Squares, Method of Least Squares, Fitting of Other Curves, Finite Differences, Forward Differences, Backward Differences. (Sections 28.2, 24.4, 24.5, 24.6, 30.2, 30.2(1), 30.2(2) Of Text Book)

Module4: Numerical Techniques-II

Central Differences, Other Difference Operators, Newton's Interpolation Formulae, Gauss's Forward Interpolation Formula, Interpolation with Unequal Intervals, Numerical Differentiation. Sections 29.7, 29.4, 29.6, 29.7(1), 29.9, 30.1.of Text Book)

Module5: Numerical Techniques-III

Numerical Integration, Trapezoidal Rule, Simpson's one –third Rule, Simpson's three-eight Rule, Weddle's Rule, Solution of Simultaneous Linear Equations (Iterative Methods)
(Sections 30.4, 30.6, 30.7, 30.8, 30.10, 28.5 of Text Book)

Text Book:

B.S Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publications.

References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons
2. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand &Sons
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Pvt. Ltd.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
HS 901 MB
MANAGERIAL ECONOMICS AND ACCOUNTANCY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT – I

Meaning and Nature of Managerial Economics: Managerial Economics and its usefulness to Engineers, Fundamental Concepts of Managerial Economics-Scarcity, Marginalism, Equimarginalism, Opportunity costs, Discounting, Time perspective, Risk and Uncertainty, Profits, Case study method.

UNIT – II

Consumer Behavior: Law of Demand, Determinants, Types of Demand; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply and Concept of Equilibrium. (Theory questions and small numerical problem can be asked).

UNIT – III

Theory of Production and Markets: Production Function, Law of Variable Protection, ISO quants, Economics of Scale, Cost of Production (Types and their measurements), Concept of Opportunity cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price-Output determination under perfect Competition and Monopoly (Theory and problems can be asked).

UNIT – IV

Capital Management: Significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions and numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT – V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance, concept and preparation of Final Accounts with sample adjustments, Analysis and interpretation of Financial statements through Ratios.
(Theory questions and numerical problems on preparation of final accounts, cash book, pretty cash book, bank reconciliations statement, calculation of some ratios).

Suggested Readings:

1. Mehta P.L., *Managerial Economics-Analysis, Problems and Cases*, Sulthan Chand & Sons Educational Publishers, 2011.
2. Maheswari S.N., *Introduction to Accountancy*, Vikas Publishing House, 2005.
3. Pnadey I.M., *Financial Management*, Vikas Publishing House, 2009.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
PC 301 EC
ELECTRONICS DEVICES AND CIRCUITS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT –I

Semiconductor Diode: Qualitative Theory of P-N Junction, P-N Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of V-I characteristic, Ideal versus Practical – Resistance levels (Static and Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics and Applications.

UNIT-II

Semiconductor Diode Applications: Half wave, Full wave and Bridge rectifiers – their operation, performance characteristics and analysis. Filters (L, C, LC and CLC filters) used in power supplies and their ripple factor calculations, design of Rectifiers with and without Filters.
Special Diodes (Qualitative Treatment only): Tunnel Diode, Varactor Diode, Schottky Diode, Light Emitting Diode, Photo Diode and Solar cells.

UNIT-III

Bipolar Junction Transistor: Transistor Junction formation (collector-base, base-emitter Junctions), Transistor biasing – band diagram for NPN and PNP transistors, current components and current flow in BJT, Ebers moll model, Modes of transistor operation, BJT V-I characteristics in CB, CE, CC configurations, BJT as an amplifier, BJT biasing techniques, operating point stabilization against temperature and device variations, Bias stabilization and compensation techniques, Biasing circuits design.

UNIT-IV

Small Signal Transistors equivalent circuits: Small signal low frequency h-parameter model of BJT, Approximate model, Analysis of BJT amplifiers using Approximate model for CB, CE and CC configurations; High frequency - Π model, Relationship between hybrid -Π and h – parameter model.

UNIT-V

Junction Field Effect Transistors (JFET): JFET formation, operation & current flow, V-I characteristics of JFET,

MOSFETs: Enhancement & Depletion mode MOSFETs, current equation, V-I characteristics, DC-biasing, Low frequency small signal model of FETs. Analysis of CS, CD and CG amplifiers, MOS Capacitor.

Suggested Reading:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, "Electronic Devices and Circuits", 3rd ed., Mc-Graw Hill Education, 2010.
2. Robert Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 11th ed., Pearson India Publications, 2015.
3. Salivahanan.S, Suresh Kumar.N "Electronic Devices and circuits", 3rd edition, Tata McGraw-Hill, 2012.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
PC 302 EC
DIGITAL SYSTEM DESIGN

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT-I
Number System and Logic Simplification: Number Systems, Base Conversion Methods and Complements of Numbers. Review of Boolean algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh map up to 5 variables, Tabular method.

UNIT-II
Combinational Logic Design: Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel Shifter, ALU, Comparators, Multiplexers, De-multiplexers, Encoder, Decoder, Driver & Display Devices, Code Converters.

UNIT-III
Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK Flip-flops, D and T Flip-Flops. Ripple and Synchronous Counters, Shift Registers, Finite State Machines, Design of synchronous FSM, Algorithmic State Machine charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation.

UNIT-IV
Logic Families: Design of TTL Logic family, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS Logic families and their interfacing. Logic implementation using PLDs-PROM, PAL and PLA. Introduction to CPLD and FPGA.

UNIT-V
Verilog HDL: Introduction to HDL, Verilog HDL Basics: Module Concept, Lexical Conventions, Value Set, Constants, Data Types, Primitives, Module modeling styles: Structural, Data flow and Behavioral.

Suggested Reading:

1. R.P.Jain, "Modern Digital Electronics", Tata McGraw Hill, 4th Edition, 2009.
2. M.Morris Mano, Michael D. Ciletti, "Digital Design", Pearson, 4th Edition, 2012.
3. Ming-Bo Lin, "Digital System Design and Practices Using Verilog HDL and FPGAs", Wiley India Pvt. Ltd., 2012.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
PC 303 EC
SIGNALS AND SYSTEMS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT-I
Introduction to Signals & Systems: Classification of signals, Operations on signals, types of systems, Exponential and Trigonometric Fourier series, Dirichlet's condition.

UNIT-II
Fourier Transform: Representation of aperiodic signal, Introduction of Fourier transform, Convergence, properties of Fourier Transform, Fourier transform of periodic signals, Singularity function, Parseval's theorem, Energy spectral density, Development of Discrete Time Fourier transform, Convergence issues associated with the DTFT.

UNIT-III
Sampling: Sampling of continuous time signals, sampling theorem, Aliasing effect, reconstruction of a signal and its samples.
Convolution & Correlation of signals: Convolution integral, Properties of convolution, Graphical method of convolution, Convolution of Discrete time signals, overlap-add and overlap-save method of discrete convolution, Definition of correlation, Auto correlation, Properties of Autocorrelation, Cross correlation of signals.

UNIT-IV
Laplace Transform: Review of Laplace transforms, region of convergence and properties, poles and zeros, relation between Laplace and Fourier transforms, properties of Laplace transform, inverse Laplace transform, Solutions to differential equation and system behavior.

UNIT-V
Z Transform: Definition of Z-Transform, Properties of Z-Transform, Region of convergence of Z-Transform, Inverse Z Transform using Inspection, Partial fraction expansion, Power series Expansion, Contour integration methods, Parseval's relation analysis of discrete time systems using Z-Transform. Realization of discrete time system using Direct form, Cascade parallel forms.

Suggested Readings:

1. Alan V. Oppenheim, Alan. S. Willsky, S Hamid Nawab, *Signals and Systems*, 2nd edition, Prentice Hall of India, 2007.
2. Lathi B.P., *Signals Systems Communications*", 1st edition, B.S. Publications, 2006.
3. Simon Haykin and Van veen, "Signal and system", Willy, second edition.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
PC 304 EC
NETWORK ANALYSIS AND SYNTHESIS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT – I

Network Theorems: Circuit Elements, Dependent and Independent Sources, Passive Elements, R, L, C, Energy Stored in L, C, Wye-Delta transformation, Nodal and Mesh analysis, Tellegen's Theorem and Maximum Power Transfer Theorem.

Network Topology: Graph, Tree, Tie set, cut set matrix, Impedance matrix formulation of node loop equations using tie-set, cut-set analysis.

UNIT – II

Two port networks: Z, Y, h, g, ABCD parameters, equivalence of two ports, Condition for Symmetry and Reciprocity. T-PI transformations, inter connection of two ports networks, Brune's test for interconnection.

UNIT – III

Response of R, L, C Networks: DC and AC excitations of RL, RC and RLC circuits, Transient Analysis. Resonance-Series and parallel. Quality factor, Bandwidth of Resonant Circuits, Steady state sinusoidal analysis using phasors, active power, reactive power and power triangle.

UNIT – IV

Filters and Attenuators and Equalizers: Constant K filters, LP, HP, BPF, BSF, m-derived composite filter design, lattice filters. Symmetrical, Asymmetric T, PI sections networks, Characteristic Impedance, Image Impedances, Iterative Impedance and propagation constant. Design of Attenuators-Symmetrical T, Pi, Lattice and Bridge-T.

UNIT – V

Network Synthesis: Fosters reactance theorems, Positive real function, Hurwitz polynomial, Driving point Impedance and admittance. Synthesis of one port RC, RL and LC networks using Foster and Cauer forms.

Suggested Readings:

1. Van Valkenberg M.E, *Network Analysis*, 3rd edition, Prentice Hall of India, 1996
2. Hayt W H, Kemerly J E Durbin, *Engineering Circuit Analysis*, 7th edition, Tata McGraw Hill, 2006.
3. Smarajit Ghosh, *Network Theory Analysis and Synthesis*, PHI Learning private Limited,2013

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
MC-220
CONSTITUTION OF INDIA

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	0	0	External Marks: 70

UNIT -1

1. Making of Indian Constitution - Constituent Assembly
2. Historical Perspective of the Constitution of India
3. Salient Features and characteristics of the Constitution of India

UNIT -2

1. The Fundamental Rights
2. The Fundamental Duties and their Legal Status
3. The Directive Principles of State Policy – Their Importance and Implementation

UNIT -3

1. Federal Structure and Distribution of Administrative, Legislative and Financial Powers between the Union and the States
2. Parliamentary Form of Government in India – The Constitutional Powers and Status of the President of India
3. Amendment of the Constitutional Provisions and Procedure

UNIT -4

1. The Judiciary
2. Constitutional and Legal Frame Work for Protection of Environmental in Global and National Level
3. Corporate Social Responsibility (CSR) International and National Scenario.

Text books:

1. D.D. Basu: An Introduction of Indian Constitution
2. Greanvile Austin: The Indian Constitution
3. Paras Diwan: Studies on Environmental cases

References books:

1. KhannnaJustice.H.R: Making of India's Constitution, Eastern Book Companies.
2. Rajani Kothari: Indian Politics
3. Ghosh Pratap Kumar: The Constitution of India. How it has been Formed, World Press.
4. A.Agrawal (Ed): Legal Control of Environmental Pollution.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
PC 351 EC
ELECTRONICS DEVICES AND CIRCUITS LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
0	0	3	1.5	External Marks:50

List of Experiments

1. Measurement of static and dynamic resistances of Silicon and Germanium diodes.
2. Zener diode Characteristics and its application as voltage regulator.
3. Design, realization and performance evaluation of half wave rectifiers without and with filters.
4. Design, realization and performance evaluation of full wave rectifiers without and with filters.
5. Static characteristics of Bipolar-junction Transistor CB configuration
6. Static characteristics of Bipolar-junction Transistor CE configuration
7. Design of Self Bias Circuit
8. Drain and Transfer Characteristics of JFET
9. Design of JFET Common Source Amplifier
10. Design of Common Emitter BJT amplifier
11. Characteristics of UJT
12. Simulate any two experiments using PSPICE

Note: A minimum of 10 experiments should be performed

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, *Micheal A. Miller*, *Basic Electronics*, *A text – Lab Manual*, 7th Edition, TMH 2001.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) III SEMISTER
PC 302 EC
DIGITAL SYSTEM DESIGN LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
0	0	3	1.5	External Marks: 30

List of Experiments

1. Implementation of all logic gates using universal gates
2. Implementation of half adder, full adder, half Subtractor and full Subtractor using universal gates
3. Implementation Boolean functions using suitable multiplexer
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Truth table verification of SR Flip Flop using NAND and NOR gates.
7. Truth table verification of JK, D and T flip flops
8. Shift register implementation using flip flops
9. Synchronous counter implementation using flip flops
10. Truth table verification of asynchronous counters
11. Design of Up/Down counters
12. Realization of logic gates using DTL, TTL, ECL, etc.,

Note: A minimum of 10 experiments should be performed.

Suggested Reading:

1. M.Morris Mano, Michael D. Ciletti, "Digital Design", Pearson, 4th Edition, 2012.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE)

IV - SEMESTER

Sl. No.	Course Code	Course Title	Scheme of Instruction			Credits
			L	T	P	
1	PC 401 EC	Analog Electronic Circuits	3	1	0	4
2	PC 402 EC	Stochastic Processes	3	0	0	3
3	PC 403 EC	Electromagnetic Waves and Transmission Lines	3	1	0	4
4	PC 404 EC	Pulse and Integrated Circuits	3	1	0	4
5	PC 405 EC	Computer Architecture and Organization	4	0	0	4
6	ES 401 EI	Electronic Measurements and Instrumentation.	3	0	0	3
7	MC 210	Environmental Science	2	0	0	0
8	PC 451 EC	Analog Electronic Circuits Laboratory	0	0	3	1.5
9	PC 452 EC	Pulse and Integrated Circuits Laboratory	0	0	3	1.5
Total			**21**	**3**	**6**	**25**

L : Lectures
T : Tutorials
P : Practical's
CIE : Continuous Internal Evaluation
SEE : Semester End Examination
BS : Basic Sciences
PC : Professional Core
PW : Project Work

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-401 EC
ANALOG ELECTRONIC CIRCUITS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT-I

Small Signal Amplifiers: Introduction to Hybrid-π model, relationship between hybrid-π & h-parameter model; Classification of amplifiers, mid-frequency, Low-frequency and high frequency analysis of single and multistage RC coupled amplifier with BJT and FET. Analysis of transformer coupled amplifier in mid frequency, Low frequency and high frequency regions with BJT.

UNIT-II

Feedback Amplifiers Analysis and Design: The feedback concept, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, Voltage and current, series and shunt feedbacks. Stability considerations, Local Versus global feedback.

UNIT-III

Oscillators Analysis and Design: Positive feedback and conditions for sinusoidal oscillations, RC oscillators, LC oscillators, Crystal oscillator, Amplitude and frequency stability of oscillator.
Regulators: Transistorized series and shunt regulators.

UNIT-IV

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

UNIT-V

RF Voltage Amplifiers: General consideration, Analysis and design of single tuned and double tuned amplifiers with BJT, Selectivity, gain and bandwidth. Comparison of multistage, single tuned amplifiers and double tuned amplifiers. The problem of stability in RF amplifiers, neutralization & uni-laterisation, introduction to staggered tuned amplifiers.

Suggested Reading:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, Electronic Devices and Circuits, 3rd ed., McGraw Hill Education, 2010.
2. David A. Bell, Electronic Devices and Circuits, 5th ed., Oxford University Press, 2009.
3. S Salivahanan, N Kumar, and A Vallavaraj, Electronic Devices and Circuits, 2nd ed., McGraw Hill Education, 2007.
4. Jacob Millman, Christos Halkias, Chetan Parikh, Integrated Electronics, 2nd ed., McGraw Hill Education (India) Private Limited, 2011.
5. Donald L Schilling & Charles Belove, Electronics Circuits, Discrete & Integrated, 3rd ed., McGraw Hill Education (India) Private Limited, 2002.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-402 EC
STOCHASTIC PROCESS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT-I

Random Variable: The random variable concept, distribution function, density function, the Gaussian random variable and other distribution functions; application in communication systems. Operations on single and multiple random variables: Expectation, moments and function that give moments. (Qualitative treatment only)

UNIT-II

Stochastic Processes: the random process concept, classification of processes, stationarity and independence, wide sense stationary, strict sense stationary, ergodicity, correlation functions, application in communication systems.

UNIT -III

Spectral characteristics of stochastic processes: power density spectrum and its properties, relationship between power spectrum and autocorrelation, cross power density spectrum and its properties, relationship between cross power spectrum and cross correlation, White and coloured noise.

UNIT-IV

Linear systems with random input: random signal response of linear systems, mean and mean squared value of system response, autocorrelation of system response, cross correlation function od input and output, spectral characteristics of system response

UNIT-V

Stochastic Noise Modelling: Narrowband random process and its characteristics, modelling of noise sources, resistive noise source, arbitrary noise sources, effective noise temperature, an antenna as noise source, autoregressive (AR), moving average (MA), autoregressive moving average (ARMA) modelling.

Suggested Readings:

1. Peyton Z Peebles, "Probability, Random Variables & Random Signal Properties", 4th edition, Tata McGraw-Hill, 2001.

2. Richard H. Williams, "Probability, Statistics, Random Processes for Engineers", Thomson Learning, 1st edition, 2003.
3. R. P. Singh and S. D. Sapre, "Communication systems: Analog & Digital" McGrawHill publishers.

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-403 EC
ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT-I

Electrostatics: Review of Vector Calculus and Coordinate systems and Transformation, Coulomb's Law, Electric Field Intensity, Electric field due to different charge distributions - Electric Field due to Line Charge, Sheet Charge and Volume Charge Distribution. Electric Flux, Flux Density, Gauss's Law and Applications. Energy and Potential, Potential Field of a Point Charge, System of Charges, potential gradient, Energy density in Electrostatic fields, Electric Dipole, convection and conduction currents, continuity equation and relaxation time, Poisson's and Laplace's Equations, Capacitance and Capacitors.

UNIT-II

Magnetostatics: Biot-Savart Law, Ampere's Circuital Law, Applications of Ampere's Law, Magnetic Flux Density, Magnetic Scalar and Vector Potentials, Forces due to magnetic fields, Magnetic Dipole, Magnetization, Inductors and Inductances, Magnetic Energy.

UNIT-III

Time Varying Fields and Maxwell's Equations: Faraday's Law, Transformer and Motional EMF's, Displace Current, Maxwell's Equations in Differential and Integral Forms, Time-Varying Potentials, Electromagnetic Boundary Conditions, Time-Harmonic Fields.

UNIT-IV

EM Wave Propagation: Uniform Plane Wave, Wave Propagation in Free Space, Dielectrics, Good Conductors-Skin Effect. Poynting's Theorem and Wave Power, Poynting Vector, Instantaneous, average and complex pointing vector, Wave Polarization-Linear, Circular and Elliptical polarizations, Reflection of Uniform Plane Waves at Normal incidence and Oblique incidence angles, Reflection coefficient, Transmission coefficient, power and energy calculations.

UNIT-V

Transmission Lines: Circuit representation, Equations of voltage and current on transmission line, propagation constant and characteristic impedance, Lossless Line, Distortion less Line, Infinite line concepts, Input impedance relations of open and short-circuited transmission lines, reflection coefficient and VSWR. The Smith Chart, Transmission Line Impedance Matching-Impedance Matching by Quarter wave Transformer, Single Stub Matching and Double Stub Matching.

Suggested Readings:

1. Matthew N,O. Sadiku, *Principles of Electromagnetics*, Oxford University Press, 2009, 4th edition.
2. David K.Cheng, *Field and Wave Electromagnetics*, Pearson Education, 2001, 2nd edition.
3. W.H.Hayt,Jr. and J.A Buck, *Engineering Electromagnetics*, Tata McGraw-Hill, 2006, 7th edition.

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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-404 EC
PULSE AND INTEGRATED CIRCUITS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT- I

Linear Wave Shaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe.

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels. Clamping operation and Clamping circuit theorem.

UNIT-II

Differential amplifiers: Classification, DC and AC Analysis of Single/Dual input Balanced and Unbalanced output configurations using BJTs. Level Translator.

Operational Amplifier: OP AMP Block diagram, ideal Op-amp characteristics, features, parameters and their Measurement, Input and Output Offset voltages and currents, Slew rate, CMRR, PSRR, Frequency response and Compensation Techniques.

UNIT-III

OPAMP Applications: Inverting and Non-inverting Amplifiers, Integrator and differentiator, summing amplifier, precision rectifier. Active filters: Low pass, high pass, band pass and band stop.

UNIT-IV

Digital Logic families: characteristics of digital ICs, RTL, TTL family IC's, characteristics and comparison among various series of TTL Family IC's, ECL family-operation and characteristics, CMOS logic family, comparison among CMOS series, Interfacing TTL and CMOS IC's.

UNIT-V

555 Timers: Functional Diagram, Monostable, Astable and Schmitt Trigger Applications.

Voltage regulators: Fixed and variable voltage regulators (78XX and 79XX).

Data Converters: Digital-to-analog converters (DAC): Weighted resistor, inverted R-2R ladder, Analog-to-digital converters (ADC): dual slope, successive approximation, flash type. Specifications of Data Converters.

Suggested Reading:

1. J. Millman and H. Taub, Pulse, Digital and Switching Waveforms - McGraw-Hill, 1991.
2. David A. Bell, Solid State Pulse circuits - PHI, 4th Edn., 2002.
3. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
4. D.Roy Chowdhury, Shail B.Jain, "Linear Integrated Circuits", 4/e, New / Age International (P) Ltd., 2008.
5. Ramakanth A Gayakwad, -Op-Amps and Linear Integrated Circuits‖, 3rd Edition, Prentice-Hall of India Limited, New Delhi, 1995.

Faculty of Engineering & Technology
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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-405 EC
COMPUTER ARCHITECTURE AND ORGANIZATION

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
4	0	0	4	External Marks: 70

UNIT-I
CPU Organization: Common bus structure, Arithmetic, Logic and Shift Unit using multiplexer, Register, Instructions, Design of CPU. Example: Intel 8085 – Programming model, Addressing modes, overview of Instruction set, Design of flowchart for CPU operation.

UNIT-II
Data Path Design: Fixed-Point Arithmetic: Addition, Subtraction, Multiplication -Robertson's, Booth's algorithms, Array Multiplier and Wallace tree multiplication, Division - Restoring and Non-restoring algorithms, floating point arithmetic and BCD Adder, Shifter: Barrel shifter and Logarithmic shifter, Examples: HDL descriptions of Fixed-Point and Floating-Point arithmetic.

UNIT-III
Control Design: Basic concepts, Hardwired Control unit design approach: classical and one-hot methods, Micro-programmed Control unit approach: basic concept, micro-program sequencer, Design examples: control unit designs for GCD processor, DMA controller and CPU control unit.

UNIT-IV
Memory and System Organization: Memory Organization: Memory hierarchy, Main memory: RAM, ROM, DRAM, Multi-level memory, cache memory: principles, address mapping techniques, replacement policies, System Organization: communication methods, IO and system control: Programmed IO, DMA and interrupts and Input-Output Processor (IOP), Examples: Three-level cache hierarchy in Intel Pentium Processor.

UNIT-V
Advances in Computer Organization: Reduced Instruction Set Computer (RISC): characteristics and architecture, Parallel processing: Pipeline – Arithmetic and Instruction, Pipeline Conflicts, Instruction Level Parallelism: super-pipeline, super-scalar architectures.

Suggested Reading:

1. Morris Mano M, *Computer System Architecture*, 3rd edition, Prentice Hall India, 2007.
2. William Stallings, *Computer Organization and Architecture*, *Design for Performance*, 7th edition, Prentice Hall India, 2006.
3. John P. Hayes, *Computer Architecture and Organization*, 3rd edition, McGraw Hill, 1998.

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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
ES 401 EI
ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT- I

Electronic Measurements: Physical measurement, forms and methods of measurements, measurement errors, Statistical analysis of measurement data, Probability of errors, Limiting errors, Standards, Definition of standard units. International standards, primary standards, secondary standards, IEEE Standards, Testing and calibration

Voltage and current measurements: DC & AC voltage measurements using Rectifier, Thermocouple & Electronic voltmeters, Ohm meter, Digital Voltmeters, Range Extension of Ammeters & Voltmeter, Digital Multi meter Frequency Counters, Frequency synthesizer, Wave meters, Wave Analyzers, Output Power meter.

UNIT-II

Bridges: AC Bridges – measurement of inductance: - Maxwell's bridge, Anderson bridge, Hays Bridge measurement of capacitance:-Schering bridge, measurement of impedance: – Kelvin's bridge, Wheat Stone bridge, HF bridges, problems of shielding, and grounding, Q-meter.

UNIT-III

Oscilloscopes: CRO operation, CRT characteristics, probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operation, A, B, alternate & chop modes, sampling oscilloscopes, storage oscilloscope, Standard specifications of CRO, Synchronous selector circuits. Analyzers Spectrum analyzers, Different types of spectrum analyzers, Display Devices and Display Systems, Logic Analyzers – State & time referenced data capture. Scalar and Vector network analyzers.

UNIT-IV

Transducers: Transducer & its classification – Basic Requirements of Transducer – Resistive Transducers: Potentiometric type, Strain Gauge type; Capacitive Transducers: Variable gap type, Variable area type and Variable Dielectric type – Inductive Transducers: Variable Reluctance type and LVDT type – Piezo Electric Transducer: Piezoelectric effect, Piezoelectric materials, PZT - Photo electric Transducers: LDR, Photo diode and Photo transistor

UNIT- V

Transducer Applications: Force Measurement using Strain Gauge transducer – Temperature measurement using RTD & Thermocouple type transducer - Pressure measurement using Differential Capacitive type transducer – Acceleration Measurement using Piezoelectric Accelerometer - Flow Measurement using Electro Magnetic Flow Meter – Fluid Velocity Measurement using Hot wire Anemometer – Level Measurement using Ultrasonic Level Gauge – Sound Level Meter – Data Acquisition system

TEXT BOOKS

1. Electronic Instrumentation – HS Kalsi, Tata McGraw Hill, 2004.
2. Electronic Instrumentation and measurements techniques by Helfrick and W.D. Cooper, PHI publications.

REFERENCE BOOKS

1. Principles of measurement systems, John P. Bentley: 3rd edition, Addison Wesley Longman, 2000.
2. Measuring Systems, Application and Design: E. O. Doebelin, McGraw Hill.
3. Electrical and Electronic Measurements: Sawhney, Khanna Publ.
4. Electronic Instrumentation and measurements: David A. Bell, 2nd Edition, PHI, 2003.
5. Electronic instruments and instrumentation Technology, M.M.S. Anand: Prentice Hall of India, 2004

Faculty of Engineering & Technology
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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
MC-210
ENVIRONMENTAL SCIENCE

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	0	0	External Marks: 70

UNIT-I

Environmental studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources use and exploitation of Surface and Ground water. Floods, Drought, Cconflicts over water, Dams-merits and demerits.

Land Resources: Land as a resource, Effects of modern Agriculture, Fertilizer-pesticide problems, Water logging and Salinity, land degradation, soil erosion and Desertification.

Energy resources: Growing energy needs renewable and non-renewable energy resources.

UNIT-II

Ecosystems and Biodiversity: Concept of Ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, food web, ecological pyramids, aquatic ecosystem (ponds, lakes, streams, rivers, oceans, estuaries) **Biodiversity:** Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-III

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, Thermal pollution. Solid waste management, Municipal solid waste management, Biomedical waste management and, hazardous waste management.

Disaster management: Types of disasters, impact of disasters on environment, infrastructure, and development.

UNIT-IV

Environmental protection and Global issues: Environmental protection acts: Air, Water, Forest and wild life Acts, enforcement of Environmental legislation. Water conservation, watershed management, and Eenvironmental ethics. Climate change, Global warming, acid rain, ozone layer depletion.

UNIT-V

Sustainable future: Concept of Sustainable Development, Sustainable development goals, Population and its explosion, Crazy Consumerism, Urban Sprawl, Environmental Education, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Suggested Readings:

1. De A.K., "*Environmental Chemistry"*, Wiley Eastern Ltd., 1989.
2. Odum E.P., "*Fundamentals of Ecology"*, W.B. Sunders Co., USA,1975.
3. G.L. Karia and R.A. Christian, *Waste Water Treatment, Concepts and Design Approach,* Prentice Hall of India, 2005.
4. Benny Joseph, *Environmental Studies,* Tata McGraw Hill,2005.
5. V.K.Sharma, *Disaster Management, National Centre for Disaster Management,* IIPE, Delhi,1999.
6. *Environmental Science: towards a sustainable future* by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi

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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-451 EC
ANALOG ELECTRONIC CIRCUITS LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
0	0	3	1.5	External Marks: 70

List of Experiments

1. Two Stage RC Coupled CE BJT amplifier.
2. Two Stage RC Coupled CS FET amplifier.
3. Voltage Series Feedback Amplifier.
4. Voltage Shunt Feedback Amplifier.
5. Current series feedback Amplifier
6. RC Phase Shift Oscillator.
7. Hartley & Colpitt's Oscillators
8. Design of Class A and Class B Power amplifiers.
9. Constant-k low pass & high pass filters.
10. m-Derived low pass & high pass filters.
11. Series and Shunt voltage Regulators
12. RF Tuned Amplifier

SPICE:

13. Two Stage RC Coupled CS FET amplifier.
14. Voltage Series Feedback Amplifier
15. Current Shunt Feedback Amplifier

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, *Micheal A. Miller, Basic Electronics, A text – Lab Manual*, 7th Edition, TMH 2001.

Note: A minimum of 10 experiments should be performed. It is mandatory to simulate any three experiments using SPICE

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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-452 EC
PULSE AND INTEGRATED CIRCUITS LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
0	0	3	1.5	External Marks: 70

List of Experiments

1. Verification of Low Pass circuit response to step, pulse and square inputs
2. Verification of High Pass RC Circuit response to step, pulse and square inputs
3. Design and verification of RC integrator and differentiator Circuits
4. Design and verification of Low pass and High pass Filters
5. Design and verification of Clipping Circuit (shunt and series)
6. Design and verification of Clamping Circuits (Positive and Negative, with and without bias)
7. Measurement of OPAMP Parameters
8. Inverting and Non-inverting OP-AMP Voltage follower
9. Integrator and Differentiator using OPAMP
10. Design and verification of Active filters
11. Astable and Mono stable multi vibrator using NE555 IC
12. Voltage regulators
13. Digital to Analog Converters
14. Analog to Digital Converters

Note: A minimum of 10 experiments should be performed.

Suggested Reading:

1. Robert Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 5th Edition, Prentice-Hall of India Private Limited, New Delhi, 1995.
2. David A. Bell, Laboratory Manual for "Electronic Devices and Circuits", 4th Edition, Prentice-Hall of India Private Limited, New Delhi, 2004.

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Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction			Lecture hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1	PC3101EC	Control System Engineering	3	0	0	3	30	70	3
2	PC3102EC	Analog and Digital Communication	4	0	0	4	30	70	4
3	PC3103EC	Microprocessor and Microcontroller	4	0	0	4	30	70	4
4	PC3104EC	Antenna Wave Propagation	3	0	0	3	30	70	3
5	PE-I*	Program Elective –I	3	0	0	3	30	70	3
6	HS3108LW	Law and Engineering	2	0	0	2	30	70	2
8	PC3109EC	Analog and Digital Communication Laboratory	0	0	3	3	25	50	1.5
9	PC3110EC	Microprocessor and Microcontroller Laboratory	0	0	3	3	25	50	1.5
10	PW3111EC	Mini-project	0	0	4	4	50	00	2
	Total		**19**	**0**	**10**	**29**	**280**	**520**	**24**

***(PE-I) Professional Elective – I**
PE3105EC: Digital System Design using Verilog HDL
PE3106EC: Bio-Medical Electronics.
PE3107EC: MOOCS Course**

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Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3101EC CONTROL SYSTEM ENGINEERING

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT – I

Introduction to control systems: Basic components, classification of control systems, effects of feedback, mathematical modeling of physical systems, transfer functions, DC and AC position control systems, block diagrams, signal flow graphs.

UNIT – II

State-variable analysis of continuous data systems: state, state variables, state equations, solution of state equations, state transition matrix and its properties, state diagram, relationship between state equations and transfer functions, concept and testing of controllability and observability.

UNIT – III

Time-domain analysis: Typical test signals, steady-state error, unit-step response and time-domain specifications and transient response of a prototype second-order system.

Stability analysis of continuous data systems: Bounded-Input, Bounded-output stability, Zero input and asymptotic stability, Routh-Hurwitz criterion.

Root-Locus technique: Properties and construction of the root loci.

UNIT – IV

Frequency-domain analysis: frequency response and frequency domain specifications, Nyquist stability criterion, Bode plots, relative stability – gain margin and phase margin.

UNIT – V

Design of control systems: Cascade and feedback compensation using Bode plots. Phase lag, phase lead and phase Lag-Lead compensators and their design.

Controllers: Introduction to PI, PD and PID controllers.

Suggested Readings:

1. Benjamin C. Kuo, "*Automatic Control Systems"*, Prentice Hall of India, 2009, 7th Edition.
2. I.J.Nagrath and M Gopal, "*Control System Engineering"*, New Age International Private Limited, New Delhi, 2008, 5th Edition
3. Katsuhiko Ogata, "*Modern Control Engineering*", Prentice-Hall of India Private Limited, New Delhi, 2003, 4th Edition.

Faculty of Engineering & Technology
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Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3102EC ANALOG AND DIGITAL COMMUNICATION

Credits: 4

Instruction: 4 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT- I

Modulation Schemes: Introduction to communication system, Need for modulation, TDM and FDM, Amplitude Modulation, Frequency Modulation (FM) and Phase Modulation (PM), concept of Generation and demodulation of the above.

UNIT- II

Transmitters and Receivers: classification of transmitters, AM and FM radio transmitters and Receivers. Noise performance of AM, FM and PM systems: Sources of noise, thermal noise, shot noise, noise in linear systems, Signal-to noise ratio (SNR) calculations for DSB-SC AM, SSB, FM and PM systems.

UNIT-III

Analog Pulse Modulation Schemes: Sampling of continuous-time signals, pulse amplitude modulation (PAM), pulse width modulation (PWM) and pulse position modulation (PPM), generation and demodulation.

Digital Coding Techniques: Elements of digital communication system, sampling theorem, quantization noise, source coding techniques: PCM, DPCM, DM, noise in PCM, DM system. Performance comparison of above systems.

UNIT – IV

Error Control Coding: Binary discrete channels, types of transmission errors, need for error control coding, Coding theory: Introduction, source coding/decoding, Huffman coding, Shannon fano coding, linear block codes, binary cyclic codes, characteristics of BCH codes, convolution codes.

UNIT – V

Digital Carrier Modulation Techniques: optimum receiver, coherent and non-coherent ASK, FSK, PSK, DPSK, MSK, and QPSK schemes, M-ary signaling schemes, and synchronization methods.

Spread Spectrum Modulation: introduction, generation and characteristics of PN sequences. DSSS, FHSS system and their application, acquisition scheme for spread spectrum receivers, tracking of FH and DS signals.

Suggested Readings:

1. Simon Haykin, *"Communication Systems"*, 4th Edition, John WiLey&sons.inc, 2000.
2. K Sam Shanmugam, *"Digital and Analog Communication Systems"*, John Wiley & sons, 1979.
3. Herbert Taub and Donald L.Schilling, *"Principles of Communication Systems"*, 2nd Edition,Tata McGraw-Hill publishing company Limited, New Delhi, 1986.
4. George Kennedy, Bernard Davis, *"Electronic Communication Systems"*, 4th Edition, Tata McGraw-Hill publishing company Limited, New Delhi, 1993.
5. John G.Proakis, *"Digital Communications"*, 4th Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 2003.

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Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3103EC MICROPROCESSOR AND MICROCONTROLLER

Credits: 4

Instruction: 4 periods per week *Duration of SEE: 3 hours*

CIE: 30 marks *SEE: 70 marks*

UNIT – I

Introduction to 8086: The 8086 Microprocessor Family- Overview, 8086 architecture, segmented memory, Pin configuration, Maximum and Minimum mode of operation, addressing modes, Memory read and write bus cycles, memory interfacing,

UNIT – II

Assembly Language Programming: Instructions for data transfer, arithmetic, logical, simple sequence program Jumps, Flags, and Conditional jumps, Loops and Constructs, Instruction Timing and Delay Loops; String instructions, Procedures and Macros, Assembler Directives, Interrupts in 8086.

UNIT – III

Peripherals: Programmable Peripheral Interface 8255 – examples using DAC, ADC, stepper motor etc., DMA controllers, Programmable Interrupt Controller 8259, Programmable Interval Timer 8254, USART 8251.

UNIT – IV

Introduction to microcontroller: Difference between microcontroller and microprocessor, 8051microcontroller architecture. 8051 registers. Memory organizations-program memory and data memory, internal RAM and bit addressable memory, special function registers.

UNIT - V

8051 assembly language programming: instruction sets, addressing modes, programming using different instructions, timers, I/O Ports, interrupts, Serial ports. Interfacing 8051 with peripherals – LCD, Stepper motor, ADC, DAC, PWM, and Relay.

Suggested Readings:

1. Douglas V.Hall, *"Microprocessors and Interfacing Programming and Hardware"*, 2nd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 1994.
2. Walter A.Triebel and Avatar singh, *"The 8088 and 8086 Microprocessors Programming, Interfacing,Software, Hardware and Applications"*, Prentice-Hall of India Private Limited, New Delhi, 1996.
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D.McKinlay, *"The 8051 Microcontroller and Embedded Systems using Assembly and C"*, 2nd Edition, Pearson education, 2009.

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B. Tech. (ECE) V SEMESTER

PC3104EC ANTENNA WAVE PROPAGATION

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT - I

Fundamentals of Antenna theory: Principle of radiation, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain, Antenna Apertures, Effective Height, Illustrative Problems. Retarded Potentials – Helmholtz Theorem Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, near field and far field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height. Loop Antennas – Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole.

UNIT - II

Antenna Arrays: Basic two element array, N element uniform linear array, Pattern multiplication, Broadside and End fire array, Planar array, Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis- Binomial array, Tschebyscheff array.

UNIT - III

Practical Antennas: Yagi-uda antenna, V- Antenna, Rhombic antenna, Travelling wave antennas, Microstrip antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry, Design equations and Characteristics.

UNIT - IV

Aperture and Modern Antennas: - Reflector Antennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, and Reflector Types – Related Features, Illustrative Problems. Horn Antennas – Types, Fermat's Principle, Radiation from sectorial and pyramidal horns, Design Considerations of Pyramidal Horns, Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications

UNIT - V

Wave propagation: Ground wave propagation. Space and surface waves, Tropospheric refraction and reflection. Sky wave propagation – Virtual height, critical frequency, Maximum usable frequency – Skip distance, Fading, Multi hop propagation

Suggested Reading:

1. Constantine A. Balanis, "*Modern Antenna Handbook*", a John Wiley & Sons, Inc., Publication, 2008.
2. John D.Kraus, Ronald J.Marhefka and Ahmed S.Khan, "*Antennas for All Applications*" 3rd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 2006.
3. K.D.Prasad, "*Antennas and Wave Propagation*", Khanna or Satya Publications.

Faculty of Engineering & Technology
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Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PROFESSIONAL ELECTIVE –I

PE3105EC DIGITAL SYSTEM DESIGN USING VERILOG HDL

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT – I
Structural modeling: Overview of Digital Design with Verilog HDL, modules and ports, gate-level modeling and design examples.
Dataflow modeling: dataflow modeling, operands and operators. Switch Level Modeling: CMOS switches and bidirectional switches and design examples. Introduction to test bench design.

UNIT – II
Behavioral Modeling: Structured Procedures, Procedural Assignments, Timing Controls, Conditional Statements, multi-way branching, Loops, Sequential and Parallel blocks, Generate blocks. Combinational, sequential logic modules and design examples.

UNIT-III
Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families Combinational Logic ICs – Specifications and Applications of TTL-74XX & Code Converters, Decoders, De-multiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, De-multiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor and Magnitude Comparators.

UNIT-IV
Sequential Logic IC's and Memories: Familiarity with commonly available TTL 74XX, CMOS 40XX Series ICs – All Types of Flip-flops, Asynchronous and synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture and applications, Static & Dynamic RAMs.

UNIT –V
Real time implementations: Fixed-Point Arithmetic modules: Addition, Multiplication, Division, Arithmetic and Logic Unit (ALU), Timer, Universal Asynchronous Receiver and Transmitter (UART), DSP modules: FIR and IIR filters, CPU design: Data path and control units.

Suggested Readings:

1. Samir Palnitkar, *"Verilog HDL A Guide to Digital Design and Synthesis,"* 2nd Edition, Pearson Education, 2006.
2. R.P.Jain, *"Modern Digital Electronics"*, Tata McGraw Hill, 4th Edition, 2009.
3. Ming-Bo Lin, *"Digital System Designs and Practices: Using Verilog HDL and FPGA*," Wiley India Edition, 2008.
4. J. Bhasker, *"A Verilog HDL Primer,"* 2nd Edition, BS Publications, 2001.

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B. Tech. (ECE) V SEMESTER

PROFESSIONAL ELECTIVE –I

PE3106EC BIO-MEDICAL ELECTRONICS

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT-I
Block diagram of a medical instrumentation system, Challenges faced with physiological measurements, Role of electronic circuits in analysis of biomedical signals. Bio-potential electrodes: Electrode-Electrolyte Interface, Equivalent circuit and applications of biopotential electrodes.

UNIT-II
Electrocardiography: Block diagram and preamplifier circuit, Single channel & multi-channel ECG systems, Holter monitors, Blood Pressure measurement: components and working principle of sphygmomanometer, Direct and indirect methods of Blood Pressure measurements. Electromagnetic and Ultrasonic techniques of Blood flow measurement.

UNIT-III
Phonocardiography- Origin of Heart Sounds, types of microphones for heart sound measurement, Contact and non-contact type of measurement. Electroencephalography: EEG-Block diagram and preamplifier circuit, electrodes and their placement. Lead configuration and general EEG graphs. Evoked potentials and their measurement.

UNIT-IV
Electromyography: Introduction to EMG signals, EMG-Block diagram and circuits, Electrodes and their placement, Nerve conduction velocity determination using EMG. Oximeters-Ear, pulse, skin reflectance.

UNIT-V
Impedance plethysmography. Ultrasonic, Xray and nuclear imaging. Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificial kidney, aids for the handicapped.

Suggested Readings:

1. Webster J.G., Medical Instrumentation Application and Design. Houghton Mifflin, 2009.
2. Khandpur R.S. Hand Book of Biomedical Instrumentation, Tata McGrawHill,2003.
3. John Enderle, Susan M. Blanchard, and Joseph Bronzino, Introduction to Biomedical Engineering, Second Edition, 2005.

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B. Tech. (ECE) V SEMESTER

HS3108LW LAW AND ENGINEERING

Credits: 2

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 Marks *SEE: 70 Marks*

Unit-I: The Legal System - Meaning, nature and definition of jurisprudence - Schools of jurisprudence- Analytical, Historical, Philosophical and Sociological Schools of jurisprudence - Meaning and Definition of Law - The Nature and functions of Law - Sources of Law - Legal and Historical sources – Precedent/Case Law as Source of Law - Definition of Precedent, Kinds of Precedent - Legislation as Source of Law- Definition of Legislation - Classification of Legislation – Supreme and Subordinate Legislation – Court System and Hierarchy of Judiciary in India - Concept of Alternative Dispute Resolution System (ADR) – History and Reasons for the growth of ADR – Important forms of ADR – Mediation - Negotiation – Arbitration - Definition of Arbitration and Essentials - Online Dispute Resolution (ODR)**.**

Unit-II: Society and Constitutional law - Social Change: Definition, nature and characteristics of Social change – Social Transformation - Factors of Social Change - Law and social Change - State, Law and Society, their inter-relationship and interdependence - Identification of Goals of Social Changes in Indian Constitution - Constitution-Meaning and Significance - Nature and Salient Features of Indian Constitution - Preamble to Indian Constitution – Fundamental Rights - Right to Equality(Art.14-18) – Freedoms and Restrictions under Art.19 - Right to Life and Personal Liberty - Directive Principles of State Policy – Significance – Nature – Classification.

Unit-III: Contract law - Definition and essentials of a Valid Contract - Meaning and Definition of Consideration - Capacity of the parties to enter into contract - Concepts of Free Consent - Lawful Object - Illegal agreements - Void and Voidable contracts - Discharge of Contracts - Remedies for breach of contract - Kinds of damages - Contract of sale of Goods – Formation of contract of sale - Sale and Agreement to Sell -Conditions and Warranties - Express and implied Conditions and Warranties - Caveat Emptor - Rights and duties of seller and buyer before and after sale – Rights of Unpaid Seller - Remedies of breach.

Unit-IV: Business Organizations - Corporate Personality - General Principles of Company Law – Companies Act, 2013 - Nature and Definition of Company - Characteristics of a Company - Different kinds of Company - Private Company and Public Company – Registration & Incorporation of Company –Advantages and Disadvantages of Incorporation - Lifting of the Corporate Veil – Company distinguished from Partnership and Limited Liability Partnership - Shares & Stock - Kinds of shares – Share Capital - Directors – Different kinds of Directors - Appointment, position , qualifications and disqualifications - Powers of Directors - Rights and Duties of Directors – Corporate Governance and Role of Directors – Meetings of Company - Winding up of Companies-Modes of Winding up of Companies.

Unit-V: Meaning, Definition and Concept of Environment - Types of Environment - Concept of Pollution – Sources of Pollution, Types of Pollution, and Effects of Pollution – Ozone Depletion – Global Warming – Climate Change - The Environment Protection Act of 1986 - Main Aims and Objectives of the Act - Meaning, Nature, Classification and significance of Intellectual Property - The main forms of Intellectual Property - Patents - Concept of Patent - Kinds of Patents - The Patents Act, 1970 - Rights and obligations of a patentee - The notion of 'abuse' of patent rights - Infringement of patent rights and remedies available - Meaning, Definition and Nature of Cyber crimes - Information Technology Act, 2000 - Specific Cyber crimes - Cyber Stalking – Hacking - Child Pornography - Phishing – Cyber Crimes and Issues of Privacy - Investigation and Jurisdiction over Cyber crimes.

References:

1. Salmond: Jurisprudence, Universal Publishers.
2. Mahajan V.D.: Legal Theory and Jurisprudence, Eastern Book Company, Lucknow.
3. M.P.Jain, Indian Constitutional Law, Wadhwa & Co, Nagpur
4. H.M.Seervai, Constitutional Law of India (in 3 Volumes), N.M.Tripathi, Bombay
5. J.N.Pandey, Constitutional Law of India, Central Law Agency, Allahabad
6. Anson: Law of Contract, Clarendon Press, Oxford, 1998.
7. Avtar Singh: Law of Contract , Eastern Book Company, Lucknow, 1998.
8. P.S.Atiyah: Sale of Goods Act, Universal Book Traders, Delhi.
9. Acharya N.K.: Law relating to Arbitration and ADR, Asia Law House, Hyderabad
10. Tripathi S.C.: Arbitration, Conciliation and ADR, Central Law Agency, Allahabad.
11. Avatar Singh: Arbitration and Conciliation, Eastern Law Book House, Lucknow
12. V.K. Krishna Iyer: Environment Pollution and Law
13. Paras Diwan : Environmental Law and Policy in India,1991
14. Dr. N. Maheshwara Swamy, Environmental Law, Asia Law House, Hyderabad.
15. Avtar Sing : Company Law, Eastern Book Company.
16. Ramaiah: Company Law, Wadhwa & Co.
17. P. Narayanan: Patent Law, Eastern Law House, 1995.
18. Roy Chowdhary, S.K. & Other: Law of Trademark, Copyrights, Patents and Designs, Kamal Law House, 1999.
19. Dr. G.B. Reddy, Intellectual Property Rights and the Law Gogia Law Agency.
20. Dr Jyoti Rattan, Dr Vijay Rattan, Cyber Laws & Information Technology, 2019, Bharat Law House, New Delhi

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B. Tech. (ECE) V SEMESTER

PC3109EC ANALOG AND DIGITAL COMMUNICATION LABORATORY

Credits: 1.5

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*

List of experiments

Cycle-I

1. AM generation and Demodulation
2. FM generation and Demodulation
3. Spectrum Analyzer and Analysis of AM and FM Signals
4. Radio Receiver measurements
5. AGC Characteristics of Radio Receiver
6. Squelch Circuit and Frequency Multiplier Circuit
7. Pre-emphasis and De-emphasis Circuits

Cycle-II

8. Sampling and Reconstruction of Sine Wave
9. PAM generation and Demodulation
10. PWM generation and Demodulation
11. PPM generation and Demodulation
12. PCM generation and Demodulation
13. Delta Modulation
14. Spectrum Analyzer and Analysis of PAM and PWM Signals
15. ASK, FSK, PSK, QPSK and DPSK modulation and Demodulation using MATLAB

Note: At least 10 experiments need to be completed in a semester (5 from analog and 5 from digital communication systems).

Suggested Readings:

1. Simon Haykin, *"Communication Systems"*, 4th Edition, John Wiley &sons.inc, 2000.
2. George Kennedy, Bernard Davis, *"Electronic Communication Systems"*, 4th Edition, Tata McGraw-Hill publishing company Limited, New Delhi, 1993.
3. K.C. Raveendranathan *"Communication systems Modelling and simulation using Matlab and Simulink"* Universities Press 2011.

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B. Tech. (ECE) V SEMESTER

PC3110EC MICROPROCESSOR AND MICROCONTROLLER LABORATORY

Credits: 1.5

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*

List of Experiments:

1. Addition, subtraction using 8085
2. Multiplication and division using 8085
3. Simple programs on 8086 kits
4. Searching and sorting using 8086 assembly language
5. String operations like concatenation and swapping using 8086
6. DAC interface to 8086
7. ADC interface to 8086
8. Stepper motor interface to 8086
9. Study of Keil software for 8051
10. Basic programs using 8051 instructions
11. Flashing LED program using 8051
12. Timer program to generate square wave on ports of 8051

Suggested Readings:

1. Ramesh S.Gaonkar, *"Microprocessor Architecture programming and Applications with the 8085"*, 5th Edition, Penram International publishing (India) private Limited, 1999.
2. Douglas V.Hall, *"Microprocessors and Interfacing programming and Hardware"*, 2nd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 1994.
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D.McKinlay, *"The 8051 Microcontroller and Embedded Systems using Assembly and C*", 2nd Edition, Pearson education, 2009.

Annexure

**Student is required to complete MOOCs course offered by the following agencies. The student is required to take prior approval from the Department, before registering for any course. The student can register for such a course in 5th Semester and/or 6th semester. Unless the student submits a pass certificate, he/she shall not be eligible for the award of degree.

SWAYAM: www.swayam.gov.in ,NPTEL: www.onlinecourse.nptel.ac.in

Abbreviations

L	:	Lectures	T	:	Tutorials
P	:	Practicals	CIE	:	Continuous Internal Evaluation
SEE	:	Semester End Examination	PC	:	Professional Core

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S. No.	Course Code	Course Title	Scheme of Instruction			Lecture hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1	PC3201EC	Digital Signal Processing	4	0	0	4	30	70	4
2	PC3202EC	VLSI Design	4	0	0	4	30	70	4
3	PC3203EC	Data Communication and Computer Networks	3	0	0	3	30	70	3
4	PE-II*	Professional Elective–II	3	0	0	3	30	70	3
5	PE-III**	Professional Elective–III	3	0	0	3	30	70	3
6	OE-I#	Open Elective-I	3	0	0	3	30	70	3
8	PC3214EC	Digital Signal Processing Laboratory	0	0	3	3	25	50	1.5
9	PC3215EC	Electronic Design and Automation Laboratory	0	0	3	3	25	50	1.5
10	PW3216EC	Summer Internship***	6-weeks				-	-	-
	Total		**20**	**0**	**6**	**26**	**230**	**520**	**23**

***(PE-II) Professional Elective–II**
PE3204EC: Embedded System Design
PE3205EC: Artificial Neural Networks and Fuzzy Logic
PE3206EC: Adaptive Filter Theory and Applications
PE3207EC: Optical Communication

****(PE-III) Professional Elective–III**
PE3208EC: Information theory and Coding
PE3209EC: Wireless Communications
PE3210EC: Radar Engineering
PE3211EC: MOOCs Course

 # Please Refer Annexure

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B. Tech. (ECE) VI SEMESTER

PC3201EC DIGITAL SIGNAL PROCESSING

Credits: 4

Instruction: 4 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT-I
Introduction: Review of Discrete Time Fourier Transform, Concept of frequency in continuous and discrete time signals, DFT and its properties, linear convolution, circular convolution. Computational complexity of direct Computation of DFT, Fast Fourier Transform, DIT and DIF, FFT algorithms for RADIX-2 case, in-place computation, Bit reversal, Finite word length effects in FFT algorithms, Use of FFT in Linear Filtering.

UNIT-II
FIR Filters: FIR digital filter design techniques. Properties of FIR digital filters, design of FIR filters using windows and frequency sampling techniques, linear phase characteristics. Realization diagrams for IIR and FIR filters, finite word length effects.

UNIT-III
IIR Filters: Analog filter design – Butterworth and Chebyshev approximations, IIR digital filter design techniques, impulse invariant technique. Bilinear transform technique. Comparison of FIR and IIR filters, frequency transformations.

UNIT- IV
Multirate signal processing: Introduction, decimation by a factor D, interpolation by a factor I, sampling rate conversion by a rational factor I/D, design of practical sampling rate converter, S/W implementation of sampling rate converter, application of Multirate signal processing.

UNIT-V
DSP Processors: Introduction to Fixed point Digital Signal Processors, TMS 320C54XX processor-architecture, addressing modes, instruction set, Assembly programming, programming issues, Applications of DSP processors.

Suggested Readings:

1. John G.Proakis and Dimitris G. Manolakis, *"Digital Signal Processing principles, Algorithms and Applications"*, 3rd Edition, Prentice-Hall of India Private Limited, New Delhi, 1997.
2. Alan V. Oppenheim and Ronald W. Schafer," Discrete *Time Signal Processing*", 3rd edition, Prentice Hall, Upper Saddle River, NJ,2010
3. Sanjit K. Mitra, "*Digital Signal Processing: A Computer-Based Approach*", 4/e, McGraw-Hill, New York,2011
4. Avatar sing and S.Srinivasan, *"Digital Signal Processing implementation using DSP Microprocessors with Examples from TMS320C54XX"*, Thomson Books Icole, 2004.

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B. Tech. (ECE) VI SEMESTER

PC3202ECVLSI DESIGN
Credits: 4

Instruction: 4 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT – I
Design Abstraction in Digital circuits, Fabrication process flow of nMOS and pMOS transistors, Overview of CMOS and BiCMOS technologies, MOSFET Transistor under static conditions, channel Length Modulation, Velocity Saturation, Sub-threshold Condition, Threshold variations, MOS structure Capacitance, CMOS Latch up, Technology scaling.

UNIT – II
CMOS Inverter, Voltage Transfer Characteristics, Static Power Consumption, Dynamic Power Consumption, Propagation Delay, Power-Energy and Energy-Delay Product, Layout Design of basic gates, Silicon on Insulation Technology, FinFET, Comparison of SOI and FinFET.

UNIT – III
Designing Combinational Logic gates in CMOS: Complementary CMOS, Ratioed Logic, Pass Transistor Logic, Dynamic CMOS logic-basic principle, Signal integrity issues in Dynamic Design, domino logic, np-CMOS logic, Merits and Demerits of above logic styles. Designing sequential logic: Bistability Principle, Multiplexer based latch, Dynamic latch, Pipelining.

UNIT – IV
Designing Arithmetic Building Blocks: Adder, Binary Adder, Full Adder, and Mirror Adder, Transmission gate-based Adder, Manchester Carry Chain Adder, Carry Bypass Adder, Carry Look ahead Adder, Carry Save Adder, Multiplier, Carry Save Multiplier, Barrel Shifter, and Logarithmic Shifter. Design of Memory Structures: ROM cells, PROM, EPROM, EEPROM, Flash Memory, SDRAM and DRAM.

UNIT – V
Implementation of strategies for Digital ICs, Testing of VLSI circuits: VLSI Chip Yield, Test procedures; Design for Testability- Ad Hoc Testing, Scan Based testing, Boundary Scan Design, Built in Self-Test, Built-in logic block observer, Test Pattern Generator, Automatic Test Pattern Generation (ATPG).

Suggested Readings:

1. JAN.M. Rabaey, A. Chandrakasan and B. Nikholic, *"Digital Integrated Circuits – A Design Perspective"*, 2nd Edition, PHI, 2007.
2. David A Hodges, H. Jackson and R. A. Saleh, *"Analysis and Design of Digital Integrated Circuits in Deep Submicron Technology"*, 3rd Edition, Tata McGraw Hill, 2007.
3. John. P. Uymera, *"Introduction to VLSI Circuits and system"*, student edition, John Wiley and Sons, 2003.

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B. Tech. (ECE) VI SEMESTER

PC3203ECDATA COMMUNICATION AND COMPUTER NETWORKS

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT - I

Data communication: A Communication Model, The Need for Protocol Architecture and Standardization, Network Types: LAN, WAN, MAN. Network Topologies: Bus, Star, Ring, Hybrid. Line configurations. Reference Models: OSI,TCP/IP.
Circuit switching: Circuit Switching Principles andconcepts.
Packet switching: Virtual circuit and Datagram subnets, X.25.

UNIT - II

Data Link Layer: Need for Data Link Control, Design issues, Framing, Error Detection and Correction, Flow control Protocols: Stop and Wait, Sliding Window, ARQ Protocols, HDLC. **MAC Sub Layer:** Multiple Access Protocols: ALOHA, CSMA, Wireless LAN. IEEE 802.2, 802.3, 802.4, 802.11, 802.15, 802.16 standards. Bridges and Routers.

UNIT - III

Network Layer: Network layer Services, Routing algorithms: Shortest Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast, Distance Vector Routing, and Congestion Control Algorithms.
Internet Working: The Network Layer in Internet: IPV4, IPV6, Comparison of IPV4 and IPV6, IP Addressing, ATMNetworks.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport Layer, Connection management, TCP and UDP protocols, ATM AAL Layer Protocol.

UNIT - V

Application Layer: Domain Name System, SNMP, Electronic Mail, World Wide Web. **Network Security:** Cryptography Symmetric Key and Public Key algorithms, Digital Signatures, Authentication Protocols.

Suggested Reading:

1. Andrew S Tanenbaum, *"Computer Networks,"* 5/e, Pearson Education,2011.
2. Behrouz A. Forouzan, *"Data Communication and Networking,"*3/e, TMH,2008.
3. William Stallings, *"Data and Computer Communications,"* 8/e, PHI,2004.
4. Douglas EComer, *"Computer Networks and Internet"*, Pearson Education Asia,2000.
5. PrakashC. Gupta, *"Data Communications and Computer Networks"*, PHI learning,2013

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B. Tech. (ECE) VI SEMESTER

PROFESSIONAL ELECTIVE–II

PE3204EC EMBEDDED SYSTEM DESIGN

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 Marks *SEE: 70 Marks*

UNIT-I

Introduction to Embedded Systems: The Embedded Design Life Cycle - Product Specification, Hardware/Software Partitioning, Iteration and Implementation, Detailed Hardware (selection of processor) and Software Design, Hardware/Software Integration, Product Testing and Release, Maintenance and Upgradation.

UNIT-II

ARM Embedded Systems: The RISC design philosophy, The ARM design philosophy, ARM processor fundamentals, registers, current program status register, pipeline, exceptions, interrupts, and vector table, core extensions, architecture revisions, ARM processor families.

UNIT-III

Embedded processing with ARM CORTEX on Zynq: Fundamentals of FPGA, types of FPGA, case study of Xilinx FPGA, Processing System, programmable logic, programmable logic interfaces, security, Zynq 7000 family members, Zynq versus standard FPGA, Zynq versus standard processor.

UNIT-IV

Embedded Software Development Tools: Host and Target Machines, Cross Compilers, Cross Assemblers, Tool Chains, Linkers/Locators for Embedded Software, Address Resolution, Locator Maps. Getting Embedded Software into Target System: PROM programmer, ROM emulator, In Circuit- Emulators, Monitors, Testing on Your Host Machine - Instruction Set Simulators, Logic Analyzers.

UNIT-V

Introduction to Real Time Operating Systems: Tasks and task states, tasks and Data, Semaphores and shared data. Operating system services: Message queues, mailboxes and pipes, timer functions, events, memory management, Interrupt routines in an RTOS environment.

Suggested Readings:

1. Arnold S Berger, "*Embedded Systems Design*", South Asian edition, CMP Books, 2005.
2. Andrew Sloss, Dominic Symes, Chris Wright, *"ARM System Developer's Guide: Designing and Optimizing System Software"*, Elsevier, 2004.
3. Louise H Crockett, Ross.A.Elliot et *al " The Zynq Book*" , Edition 1, Strathclyde academic media, July 2014.
4. David E Simon, *"An Embedded software primer"*, Pearson, 2012

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B. Tech. (ECE) VI SEMESTER

PROFESSIONAL ELECTIVE –II

PE3206EC ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 Marks *SEE: 70 Marks*

Unit –I

Introduction to Neural Networks: Introduction, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Essentials of Artificial Neural Networks: Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Applications of ANN.

Unit- II

Feed Forward Neural Networks: Single Layer: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.
Multilayer: Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back propagation Algorithm, Kolmogorov Theorem

Unit–III

Associative Memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem Architecture of Hopfield Network: Discrete and Continuous versions

Unit- IV

Classical & Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Unit - V

Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision-making system, Defuzzification to crisp sets, Defuzzification methods. Fuzzy logic applications

Suggested Readings:

1. James A Freeman and Davis Skapura, *"Neural Networks"*, Pearson Education, 2002.
2. B. Yeganaranarana, "*Artificial Neural Networks*", Prentice Hall, New Delhi, 2007.
3. Bart Kosko, "*Neural Networks and Fuzzy Logic System*", PHI Publications.

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B. Tech. (ECE) VI SEMESTER

PROFESSIONAL ELECTIVE –II

PE3206EC ADAPTIVE FILTER THEORY AND APPLICATIONS

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 Marks *SEE: 70 Marks*

UNIT - I

Approaches to the development of adaptive filter theory. Introduction to filtering, smoothing and prediction. Wiener filter theory, introduction; Error performance surface; Normal equation; Principle of orthogonality; Minimum mean squared error; example.

UNIT - II

Gradient algorithms; Learning curves; LMS gradient algorithm; LMS stochastic gradient algorithms; convergence of LMS algorithms.

UNIT - III

Applications of adaptive filter to adaptive noise cancelling, Echo cancellation in telephone circuits and adaptive beam forming.

UNIT - IV

Kalman Filter theory; Introduction; recursive minimum mean square estimation for scalar random variables; statement of the kalman filtering problem: the innovations process; Estimation of state using the innovations process; Filtering examples.

UNIT V

Vector Kalman filter formulation. Examples. Application of kalman filter to target tracking.

Suggested Reading:

1. Sophoclas, J. Orphanidies, *"Optimum signal processing an introduction"*, McMillan, 1985.
2. Simon Haykins, *"Adaptive signal processing"*, PHI, 1986.
3. Bernard Widrow, *"Adaptive signal processing"*, PHI, 1986.
4. Bozic. SM., *"Digital and Kalman Filtering"*.

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B. Tech. (ECE) VI SEMESTER

PROFESSIONAL ELECTIVE –II

PE3207EC OPTICAL COMMUNICATIONS

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT -I
Overview of Optical Fiber Communication: Introduction, Historical development, general system, advantages, disadvantages, and applications of optical fiber communication, optical fiber waveguides, basic optical laws, Ray theory, step index and graded index fibers, ray optics representation, fiber materials.

UNIT - II
Transmission Characteristics of Optical Fibers: Introduction, Attenuation, absorption, scattering losses, bending loss, dispersion, Intra modal dispersion, Inter modal dispersion.

UNIT - III
Optical Sources and Detectors: Introduction, LED's, LASER diodes, Photo detectors, Photo detector noise, Response time, double hetero junction structure, Photo diodes, comparison of photo detectors.

UNIT - IV
Fiber Couplers and Connectors: Introduction, fiber alignment and joint loss, fiber splices, fiber connectors and fiber couplers.
Optical Receiver: Introduction, Optical Receiver Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection.

UNIT –V
Analog and Digital Links: Analog links – Introduction, overview of analog links, CNR, Digital links – Introduction, point–to–point links, System considerations, link power budget, resistive budget.
WDM Concepts and Components: WDM concepts, overview of WDM operation principles, WDM standards,

Suggested Reading:
1. Optical Fiber Communication – Gerd Keiser, 4th Ed., MGH, 2008.
2. Optical Fiber Communications– – John M. Senior, Pearson Education, 2007.
3. Fiber optic communication – Joseph C Palais: 4th Edition, Pearson Education.

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B. Tech. (ECE) VI SEMESTER

PROFESSIONAL ELECTIVE –III

PE3208EC INFORMATION THEORY AND CODING

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT - I

Coding for Reliable Digital Transmission and storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies. Channel Coding Channel capacity, binary symmetric channel, binary erasure channel, Shannon's channel coding theorem, Huffman coding.

UNIT - II

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT - III

Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT - IV

Convolutional Codes: Encoding of Convolutional Codes- Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT - V

BCH Codes: Minimum distance and BCH bounds, Decoding procedure for BCH codes, Syndrome computation and iterative algorithms, Error locations polynomials for single and double error correction.

Suggested Readings:

1. K. Sam Shanmugam, "*Digital and analog communication systems*", John Wiley India Pvt. Ltd, 1996.
2. Simon Haykin, "*Digital communication*", John Wiley India Pvt. Ltd, 2008.
3. Muralidhar Kulkarni, K.S. Shivaprakasha, "*Information Theory and Coding*", Wiley India Pvt. Ltd, 2015, ISBN: 978-81-265-5305-1.
4. Shu Lin, Daniel J. Costello, Jr, "*Error Control Coding- Fundamentals and Applications*", Prentice Hall, Inc 2014.
5. Man Young Rhee, "*Error Correcting Coding Theory*" McGraw – Hill Publishing 1989

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B. Tech. (ECE) VI SEMESTER

PROFESSIONAL ELECTIVE –III

PE3209EC WIRELESS COMMUNICATIONS

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT-I

Overview of wireless communication system, History of wireless communication, current wireless systems, wireless spectrum, 2G, 3G, 4G and 5G wireless communication standards.

UNIT-II (Qualitative treatment only)

Comparison of digital Modulation schemes: Information Capacity, Bits, Bit Rate, Baud, and M-ARY Coding, ASK, FSK, PSK, QAM, BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK, Band Width Efficiency.

UNIT-III

The wireless communication environment, classification of fading channels, different parameters related to fading mechanisms, modeling of wireless systems, system model for narrowband signals, Rayleigh fading wireless channel.

UNIT-IV

Basics mechanism of Code division multiple access (CDMA), fundamentals of CDMA codes, Introduction to MIMO wireless communication systems, MIMO system model, MIMO zero forcing and MMSE receiver.

UNIT-V

Multi carrier modulation, data transmission using multiple carriers, basics of orthogonal frequency division multiplexing (OFDM) systems, cyclic prefix, MIMO-OFDM system

Suggested Readings:

1. A. K. Jagannatham, *Principles of modern wireless communications systems*. McGraw Hill Education, 2015.
2. A. Goldsmith, *Wireless Communications*. New York: Cambridge Univ. Press, 2005.
3. T. S. Rappaprt, Wireless communications principles & Practices, Pearson, 2010.

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B. Tech. (ECE) VI SEMESTER

PROFESSIONAL ELECTIVE –III

PE3210EC RADAR ENGINEERING

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT-I

Basics of Radar: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation.

UNIT-II

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

UNIT-III

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

UNIT-IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar –Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT-V

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Radar Receivers: Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Introduction to Phased Array Antennas.

Suggested Readings:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Edition, 2007.
2. Introduction to Radar Systems – Merrill I. Skolnik, 3rd Edition, Tata McGraw-Hill, 2001.
3. Radar Principals, Technology, Applications – Byron Edde, Pearson Education, 2004.
4. Radar Principles – Peebles, Jr., P.Z.Wiley, NewYork, 1998.

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B. Tech. (ECE) VI SEMESTER

PC3214ECDIGITAL SIGNAL PROCESSING LABORATORY

Credits: 1.5

Instruction: 3 periods per week *Duration of SEE:3 hours*
CIE: 25 Marks *SEE: 50 Marks*

List of Experiments

1. (a)Generation of basic signals based on recursive difference equations.
   (b) Operations on Basic sequences
2. (a) Linear and Circular Convolutions in time domain and frequency domain
   (b) Determination of autocorrelation and Power Spectrum of a given signal(s)
3. (a) Fast Fourier Transform – DIT and DIF algorithm
   (b) Spectrum analysis using DFT
4. (a) Generation of windows – Rectangular, Hamming and Hamming window
   (b) Design of LPF, HPF, BPF and BSF using windowing technique
5. (a) Design of Butterworth Filter using Impulse Invariant and Bilinear transformation
   (b) Design of Chebyshev Filter using Impulse Invariant and Bilinear transformation
6. (a) Implementation of Decimation and Interpolation Process.
   (b) Implementation of I/D sampling rate converters.
7. (a) Study of TMS320C54X DSP processor
   (b) Arithmetic operation using TMS320C54XX
8. MAC operation using various addressing modes
9. (a) Linear Convolution
   (b) Circular Convolution
10. (a) FFT Implementation
    (b) Waveform Generation – Sine wave and Square wave
11. Implementation of FIR filter on DSP processor
12. Implementation of IIR filter on DSP processor

Suggested Readings:

1. Digital Signal Processing Using. **MATLAB**, Third Edition. Vinay K. Ingle and John G. **Proakis**

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B. Tech. (ECE) VI SEMESTER

PC3215ECELECTRONIC DESIGN AND AUTOMATION LABORATORY

Credits: 1.5

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 25 Marks *SEE: 50 Marks*

List of Experiments:

Part A (Digital VLSI front-end Design)

1. Develop VERILOG HDL code and Test bench for the following:
   a. Multiplexer, Decoder, Encoder, Parity Generator, D flip-flop, four-bit adder and magnitude comparator using structural modelling
   b. Four-bit parallel adder/subtractor, zero/one detector and JK flip-flop using data flow modelling
   c. Arithmetic and logic unit, D, SR and JK flip-flops with synchronous and asynchronous resets, universal shift register and BCD- seven segment decoder using behavioral modelling
   d. Asynchronous, Synchronous, Ring and Johnson counters.
   e. Sequence Detector using Mealy and Moore type state machines.
2. Develop VERILOG HDL code for eight to three priority encoders using structural modelling and develop a test bench to cover all the functionalities. Assume each gate has a zero delay and three-simulation units delay.
3. Develop VERILOG HDL code for a four-bit carry look-ahead adder in structural modelling. Develop test bench to cover all the functionalities. Assume case (i) zero gate delay and case (ii) inverter: 2 and NAND/NOR gates: 4 simulation units.
4. Develop VERILOG HDL code for four to sixteen decoder using two-to-four decoders and other combinational logic. Develop test bench to cover all the functionalities. Assume case (i) zero gate delay and case (ii) inverter: 2 and NAND/NOR gates: 4 simulation units.
5. Using conditional operator, write Verilog HDL code to shift input *data* right arithmetic by the number of positions specified by another input *shift*. Develop test bench to cover all the functionalities.
6. Write Verilog HDL code to realize all bit Zero/One detector. Develop test bench to cover all the functionalities.
7. Develop Verilog HDL code to realize a MOD-10 synchronous decimal up counter with asynchronous reset and clear inputs. Develop test bench to cover all the functionalities.
8. Develop VERILOG HDL code for the state machine of control unit of GCD processor.
9. Develop Verilog HDL code to realize a four-bit universal shift register. Develop test bench to cover all the functionalities.
10. Develop Verilog HDL code to realize a four-bit ring counter with asynchronous reset and clear inputs. Develop test bench to cover all the functionalities.
11. Develop Verilog HDL code to realize a four-bit twisted ring counter with asynchronous reset and clear inputs. Develop test bench to cover all the functionalities.
12. Design a clock generator where its output *clk* is initialized to 0 and has a period of 500-time units and a duty cycle of 70 %.

13. Design four-bit binary to Gray converter and Gray to binary converter.

14. Acquaint with Synthesis and FPGA porting of the code.

Part B (Digital VLSI back-end Design)

1. Design and analyze the following CMOS circuits:
    a. Inverter using static, ratioed, dynamic and domino logic styles
    b. Two-input NAND gate
    c. Two-input NOR gate
    d. Two-to-one Multiplexer using transmission gate
    e. Design a one-bit full adder circuit
    f. Design a one-bit SRAM cell.
2. Draw the layout and evaluate the performance of CMOS Inverter and two-input CMOS NAND gate.

Suggested Readings:

1. Samir Palnitkar, "*Verilog HDL A Guide to Digital Design and Synthesis,*" 2nd Edition, Pearson Education, 2006.
2. Ming-Bo Lin, "Digital System Designs and Practices: Using Verilog HDL and FPGA," Wiley India Edition, 2008.
3. John P.Uyemura "Introduction to VLSI Circuits and Systems" John Wiley & Sons, ISBN No: 9971-51-417-6, 2002.
4. Neil H E Weste and David Money Harris, "CMOS VLSI design: A circuits and systems perspective" 4th Edition, Pearson, 2015.

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B. Tech. (ECE) VI SEMESTER

PW3216EC SUMMER INTERNSHIP

Credits: 0

Instruction: 6 weeks *Duration of SEE: --*
CIE: 50 *SEE: ---*

Summer Internship is introduced as part of the curricula for encouraging students to work on problems of interest to industries. A batch of two or three students will be attached to a person from an Electronics Industry / R & D Organization / National Laboratory for a period of 8 weeks. This will be during the summer vacation following the completion of the VI semester course. One faculty member will act as an internal guide for each batch to monitor the progress and interacts with the Industry guide.

After the completion of the project, students will submit a brief technical report on the project executed and present the work through a seminar talk to be organized by the department. Award of sessionalsare to be based on the performance of the student at the work place to be judged by industry guide and internal guide (25 Marks) followed by presentation before the committee constituted by the department (25 Marks). One faculty member will coordinate the overall activity of Summer Internship.

Annexure

- ✓ Students should not choose same department subject as an Open elective subject.
- ✓ Students can select any one of the following subjects as an Open elective subject.

Open Elective subjects offered from different department

Sl.No	Course Code	Name of the subject	Branch
1	OE3213EC	Microprocessor and Interfacing	ECE
2	OE3207CS	Fundamentals of Data Structures	CSE

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B. Tech. (ECE) VI SEMESTER

OPEN ELECTIVE-I

OE3213EC MICROPROCESSORS AND INTERFACING

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 Marks *SEE: 70 Marks*

UNIT I
Evolution of microprocessors, 8085 microprocessor architecture, addressing modes and instruction sets. Basic assembly language programming, pin configuration, timing diagram of read and write operation.

UNIT II
8086 architecture-functional block diagram, register organization, memory segmentation, programming model, pins description in maximum mode and minimum mode, timing diagrams.

UNIT III
Instruction formats, addressing modes, classification of instruction set, assembler directives, macros, 8086 microprocessor assembly language programs: simple programs involving data transfer operation, arithmetic operation, logical operation, branch operation, machine control operation, string manipulations, stack and subroutine operations.

UNIT IV
8255 Programmable peripheral interfaceblock diagram and various modes of operation. Interfacing of ADC, DAC, keyboard, seven segment display, stepper motor interfacing and 8254 (8253) programmable interval timers.

UNIT V
Interrupt structure of 8086, interfacing programmable interrupt controller 8259 and DMA Controller 8257 to 8086 microprocessor. Serial communication standards, RS 232,Serial data transfer schemes and block diagram of 8251 USART.

Suggested Readings:
1. Ramesh Gaonkar, "Microprocessor architecture, programming and applications with the 8085",Penram International Publication (India) Pvt. Ltd.
2. Douglas V. Hall, "Microprocessors and Interfacing", Tata McGraw Hill Publication.
3. Sivarama P. Dandamudi, "Introduction to Assembly Language Programing From 8086 to Pentium Processors", Springer Publication.
4. Walter A. Triebel and Avtar Singh, "The 8088 and 8086 Microprocessors: Programming, Interfacing Software, Hardware and Applications", Pearson Publication.
5. A. K. Ray and K. M. Bhurchandi, "Advance microprocessors and Peripherals" Tata McGraw Hill Publication.
6. Lyla B. Das, "The X86 Microprocessors, Architecture, Programming and Interfacing (8086 to Pentium)", Pearson Publication.

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B. Tech. (ECE) VI SEMESTER

OPEN ELECTIVE – I

OE3207CS FUNDAMENTALS OF DATA STRUCTURES

Credits: 3

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 Marks *SEE: 70 Marks*

UNIT-I

Introduction: Introduction to data structure, types of data structures, revision of arrays, memory representation of arrays, operations on arrays, static versus dynamic memory allocation, pointers, self-referential Structure Time complexity.

UNIT-II

Stack-Queue (Linear Data structures): Definition of stack, operations on stack, implementation of stack. Applications of Stack.

UNIT-III

Definition of queue, operations on queue, implementation of queue using arrays
Applications of queue, Circular queue and priority queue.

UNIT-IV

Trees-Graphs (Nonlinear Data structures): definition of trees, Terminology on trees, binary tree, binary search tree and its operations, tree traversal techniques. Applications of Trees.

UNIT-V

Graph: definition, terminology on graphs, representation of graphs, graph traversal techniques, spanning tree, minimum cost spanning tree algorithms. Applications of Graphs.

Text Books:

1.Sahni Horowitz, “Fundamentals of data structures in C”, UniversitiesPress, second edition, 2008, ISBN No- 978-8173716058.
2.R Venkatesan,S Lovelyn Rose,“Data structures”,Wiley, second edition, 2019, ISBN No-978-8126577149.

References:

1.Narasimha Karumanchi, “Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles”, Careermonk Publications, 2016, ISBN-No: 978-8193245279.

ABBREVIATIONS

L	:	Lectures	T	:	Tutorials
P	:	Practicals	CIE	:	Continuous Internal Evaluation
SEE	:	Semester End Examination	PC	:	Professional Core
OE	:	Open Elective	PW	:	Project Work

**Students have to undergo summer internship of 6 Weeks duration at the end of semester VI and valuation will be done in VII semester.

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B. Tech. (ECE) VII Semester

S. No.	Course Code	Course Title	Scheme of Instruction			Lecture Hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1.	PC4101EC	Microwave Engineering	3	0	0	3	30	70	3
2.	PE-IV	Professional Elective-IV	3	0	0	3	30	70	3
3.	PE-V	Professional Elective-V	4	0	0	4	30	70	4
4.	OE-II	Open Elective-II	2	0	0	2	30	70	2
5.	PC4111EC	Microwave Engineering Lab	0	0	2	2	25	50	1
6.	PW4112EC	Project Stage-I	0	0	4	4	50	0	2
7.	SI4113EC	Summer Internship*	6 Weeks				50	0	0
Total			12	0	6	18	245	330	15

*Students have to undergo summer internship of 6 Weeks duration at the end of semester VI and Evaluation will be done in present semesters.

L Lecture
T Tutorial
P Practical
CIE Continuous Internal Evaluation
SEE Semester End Examination
PC Professional core

Professional Elective-IV

PEIV4102EC	Satellite Communications
PEIV4103EC	Wavelet Theory and Applications
PEIV4104EC	Fault Detection in Digital Systems

Professional Elective-V

PEV4105EC	Digital Image Processing
PEV4106EC	Internet of Things
PEV4107EC	Low Power VLSI Design

Open Elective-II

OEII4108HS	Disaster Management
OEII4109EE	Non-Conventional Energy sources
OEII4110HS	Startup Entrepreneurship

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B. Tech. (ECE) VII Semester

PC4101EC: MICROWAVE ENGINEERING

(Professional Core)

Credits: 3

Instruction: *3 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT – I

Microwave frequency bands, Advantages and Applications of Microwaves, TE & TM Waves in rectangular wave guides, Group and Phase velocity, Cutoff wavelength, Wave impedance, Attenuation and Q of Wave guides, Wave guide resonators, Power handling capability, Transmission line analogy, Waveguide Design

UNIT – II

Microwave circuit concepts, Normalized voltage and current, scattering parameters, properties of S-Matrix, Unitary property, S-Matrix for directional coupler, Magic tee, Construction, principle and applications of Attenuator, Phase Shifter, Circulator, Isolator, S-Matrix of Circulator

UNIT – III

High Frequency limitations of conventional tubes, Two cavity Klystron, Bunching by velocity modulation, Small signal theory of bunching, Effect of grid interception and de-bunching. Tran's admittance, Reflex Klystron, Mathematical theory of bunching, Admittance spiral and condition of oscillation, Principle of operation, construction and characteristics of TWT Amplifier, Backward wave oscillator (qualitative treatment only)

UNIT – IV

Principle of operation, construction and characteristics of multi-cavity magnetron, Microwave Solid-state devices: Introduction, Classification and Applications. TEDs —Introduction, Gunn Diode — Principle, RWH Theory, Characteristics, Basic modes of Operation, Oscillation modes, Avalanche transit time devices- IMPATT,TRAPATT

UNIT – V

Microwave Measurements: Blocks and features of microwave bench; frequency measurement, power measurement, attenuation measurement, impedance, phase shift and VSWR measurements.

Suggested Readings:

1. Samuel Y. Liao, "*Microwave Devices and Circuits*", 3rd Edition, PHI, 1994.
2. Pozar D.M., "*Microwave Engineering*", 3rd edition, John Wiley & Sons, 2005.
3. Skalnik, Krauss, Reich, "*Microwave principles*", East West Press, 1976.

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B. Tech. (ECE) VII Semester

Professional Elective-IV (a)
PEIV4102EC: SATELLITE COMMUNICATIONS

Credits: 3

Instruction: *3 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT–I

Origin of Satellite communications, a brief history of Satellite Communication, Basic principles and properties of satellite communication; Earth segment, Space segment, Interpretation of Kepler's Laws; Orbital Mechanics: The Equation of the Orbit, Describing the Orbit, Locating the Satellite in the Orbit, Orbital effects in communication system Performance

UNIT– II

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

UNIT– III

Earth Stations: Earth Station Design for Low System Noise Temperature, Design of large antennasand small earth station antennas. Low noise amplifiers and High power Amplifiers for Satellite communication.

UNIT– IV

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

UNIT– V

Satellite Navigation Applications: Global and Regional Satellite Navigation Systems- Operating Principles, Advantages, Limitations, Current Status and Applications; Multiple Access Techniques: FDMA, TDMA and CDMA.

Suggested Readings:

1. Wilbur L. Pitchand and Henri G. Suyderhoud, Robert A. Nelson, "*Satellite CommunicationSystems Engineering*", 2nd edn.3rd Impression, Pearson Education.2008.
2. Timothy Pratt and Charles Nestian. W, "*Satellite Communication*", John Wiley and Sons, 1988.
3. Tri T. Ha, "*Digital Satellite Communication*", Tata McGraw- Hill, Special Indian Edition 2009.

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B. Tech. (ECE) VII Semester

Professional Elective-IV (b)
PEIV4103EC: WAVELET THEORY AND APPLICATIONS

Credits: 3

Instruction: *3 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT-I

Introduction Stationary and non-stationary signals, Signal representation using basis function, Brief introduction to Fourier transform and Short time Fourier transform, Time frequency analysis, Bases of time frequency, Classes of mother wavelets: Haar, Daubechies, bi-orthogonal.

UNIT-II

Continuous wavelet transform (CWT), Time and frequency resolution of the CWT, Construction of continuous wavelets: Spline, orthonormal, bi-orthonormal, Inverse CWT, Redundancy of CWT, Zoom property of the CWT, Filtering in CWT domain.

UNIT-III

Discrete Wavelet Transform (DWT), Filter banks Orthogonal and biorthogonal two-channel filter banks, Design of two-channel filter banks, Tree-structured filter banks, and discrete wavelet transform, Non-linear approximation in the Wavelet domain

UNIT-IV

Multi resolution analysis, Construction and Computation of the DWT, the redundant DWT. Multi Resolution Analysis Multirate discrete time systems, Bi-orthogonal wavelet bases, 2-dimensional wavelet transforms

UNIT-V

Applications Signal and Image compression, Detection of signal changes, analysis and classification of audio signals using CWT, Wavelet based signal de-noising and energy compaction, Digital Communication and Multicarrier Modulation, Trans-multiplexers

Suggested Readings:

1. *A Wavelet Tour of Signal Processing*, 2nd edition, S. Mallat, Academic Press, 1999.
2. *Wavelets and Sub band Coding*, M. Vetterli and J. Kovacevic, Prentice Hall, 1995.
3. Wavelet transforms: Introduction, Theory and applications, Raghuveer rao and Ajit S.Bopardikar, Pearson Education Asia, 2000.
4. *Multirate Systems and Filter Banks*, P. P. Vaidyanathan, Pearson Education, 2004.

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B. Tech. (ECE) VII Semester

Professional Elective-IV (c)
PEIV4104EC: FAULT DETECTION IN DIGITAL SYSTEMS

Credits: 3

Instruction: *3 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT – I

Introduction: Modeling and testing digital circuits at different levels of abstraction, Types of testing, Errors and Faults, Fault classification and modeling, Hazards, Test generation and evaluation.

UNIT – II

Fault detection in Combinational Circuits: Detection of single stuck faults using Fault Table method, path sensitization and Boolean difference method, fault detection in two level and multilevel circuits, Bridging fault model, detection of non-feedback and feedback bridging faults, bridging fault simulation and test generation.

UNIT – III

Fault Detection in Sequential Circuits: State identification with homing and distinguishing experiments, Design of fault detection experiments for diagnosable machines.

UNIT – IV

Self-Checking Design: Basic concepts, application of Error-detecting and Error-correcting codes, multiple bit errors, checking circuits and self-checking, self-checking checkers, parity-check functions, totally self-checking m/n code checkers, totally self-checking equality checkers, self-checking Berger code checkers.

UNIT – V

Test Generation algorithms for SSFs: Combinational Circuits-Fault oriented ATG- algorithms and selection criteria, fault independent ATG, ATG for sequential circuits using iterative array model.

Suggested Readings:

1. Samuel C Lee, "*Digital Circuits and Logic Design*". PHI Pvt. Ltd. 2000
2. Zvi Kohavi, "Switching *and Finite Automata Theory*", TMH.2nd edition
3. M. Abramovici, M. Breuer, A. Friedman, "Digital *System Testing and testable design*", Jaico Publications

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B. Tech. (ECE) VII Semester

Professional Elective-V (a)
PEV4105EC: DIGITAL IMAGE PROCESSING

Credits: 4

Instruction: *4 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT-I

Introduction: Fundamental steps and components of digital image processing, image sensing and acquisition, sampling and quantization, representation of digital images, relationships between pixels neighborhood of a pixel, distance measures, arithmetic and logical operations on images, spatial transformations. Digital Image Transforms: Two dimensional DFT and its properties, DCT, unitary Transforms, Walsh transform, Hadamard Transform, slant transform and KL transform.

UNIT-II

Image Enhancement: Simple intensity transforms, Piecewise linear transforms and histogram processing. Spatial Domain Filtering: Correlation and convolution, linear and nonlinear filters-smoothing and sharpening filters, Frequency Domain Filtering: Image smoothing and sharpening - homomorphic filtering, selective filtering, Image Restoration and Degradation model, noise models, restoration in the presence of noise.

UNIT-III

Image Compression: Types of redundancy – coding redundancy, interpixel redundancy, psychovisual redundancy, fidelity criteria, image compression system model, lossless and lossy coding, huffman coding, LZW coding, arithmetic coding, run length coding, bit-plane coding, constant area coding, lossless and lossy predictive coding, JPEG 2000

UNIT-IV

Image Segmentation: Point, line and edge detection, image gradient and gradient operators, edge linking and boundary detection; thresholding- global, multiple, region based segmentation- region growing, region splitting and merging. Morphological Image Processing: Structuring element, erosion and dilation, opening and closing, hit-or miss transformation, basic morphological algorithms and grey-scale morphology, Active Contour Models.

UNIT-V

Color Fundamentals, Color Models, Pseudo color Image Processing, Color Transformations: Formulation, Color Components, Color Slicing; Color Image Smoothing and Sharpening; Segmentation in HSI Color space and RGB Vector Space; Noise in color images.

Suggested Readings

1. R.C. Gonzalez and R.E. Woods, *Digital Image processing*, 3rd ed., New Delhi: Pearson Education, 2009.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, *Digital image processing using MATLAB*, 1st ed., New Delhi: Pearson Education, 2004.
3. William K. Pratt, *Digital Image Processing*, 4th ed., New York: John Wiley and Sons, 2002

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B. Tech. (ECE) VII Semester

Professional Elective-V (b)
PEV4106EC: INTERNET OF THINGS

Credits: 4

Instruction: *4 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT- I

Basics of Networking & Network Security: Network Types, Layered Network Models, Addressing, Internet of Things TCP/IP Transport layer, Security, Network Confidentiality, Cryptography, Message Integrity and Authenticity, Digital signatures, Key Management, Internet Security& Firewall.

UNIT- II

Predecessors of IoT & Emergence of IoT–Introduction, Wireless Sensor Networks, Machine-to-Machine Communications, Cyber Physical Systems, Architectural components of CPS, IoT versus M2M, IoT versus CPS, IoT versus WoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components, Addressing Strategies in IoT.

UNIT- III

IoT Architecture-State of the Art – Introduction, State of the art, Architecture Reference Model-Introduction, Reference Model, and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT- IV

IoT Sensing and Actuation & IoT Processing Topologies and Types: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuators Types, Actuator Types, Actuator Characteristics, Data Formats, Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading, Offload location, Offload decision making, Offloading considerations.

UNIT- V

IoT Case Studies: Agricultural IoT, Components of an agricultural IoT, Advantages of IoT in agriculture, Case Studies, Vehicular IoT, Components of vehicular IoT, Advantages of vehicular IoT, Healthcare IoT, Components of healthcare IoT, Advantages and risk of healthcare IoT, Case Studies, Evolution of New IoT Paradigms, Challenges Associated with IoT, Emerging Pillars of IoT.

Suggested Readings:

1. Sudip Mishra, Anandarup Mukherjee, Arijit Roy: *Introduction to IOT*, Cambridge University Press
2. Bassi, Alessandro, et al, "*Enabling things to talk*", Springer-Verlag Berlin -2016

3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "*IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things*", CISCO Press, 2017
4. Neil Cameron: *Arduino Applied-Comprehensive Projects for Everyday Electronics*, Apress.
5. *Internet of Things*, Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, John Wiley&Sons.
6. Massimo Banzi, Michael Shiloh Make: *Getting Started with the Arduino*, Shroff Publisher/Maker Media Publishers.

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B. Tech. (ECE) VII Semester

Professional Elective-V (c)
PEV4107EC: LOW POWER VLSI DESIGN

Credits: 4

Instruction: *4 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT-I

MOS transistor major evolutions-Bulk CMOS technologies, SOI technologies, MOS transistor saturation and sub threshold currents, tunnel currents, Leakage current components, scaling effects, Innovative transistor architectures

UNIT-II

Power Estimation Techniques: Circuit Level – Modeling of Signals, Signal Probability Calculations, Statistical techniques for combinational circuits, Power estimation at circuit level, High Level Power Estimation.

UNIT-III

Power Optimization Techniques – I: Dynamic Power Reduction – Dynamic Power Component, Circuit Parallelization, Voltage Scaling Based Circuit Techniques, Circuit Technology – Independent Power Reduction, Circuit Technology Dependent Power Reduction;

UNIT-IV

Power Optimization Techniques – II: Leakage Power Reduction – Leakage Components, Design Time Reduction Techniques, Run-time Stand-by Reduction Techniques, Run-time Active Reduction Techniques, techniques to reduce leakage in Cache Memories.

UNIT-V

Power Optimization Techniques – III: Low Power Very Fast Dynamic Logic Circuits, high throughput CMOS circuit techniques, Low Power Arithmetic Operators- addition and multiplication, Energy Recovery Circuit Design

Suggested Readings:

1. Kaushik Roy and Sharat Prasad, "*Low-Power CMOS VLSI Circuit Design*", Wiley Interscience Publications, 2000
2. Christian Piguet, "*Low Power CMOS Circuits Technology, Logic Design and CAD Tools*", 1st Indian Reprint, CRC Press, 2010
3. Jan M Rabaey, A Chandrakasan, Borvioje N "*Digital Integrated Circuits Design Perspective*" PHI-2nd edition, 2005

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B. Tech. (ECE) VII Semester

Open Elective-II (a)
OEII4108HS: DISASTER MANAGEMENT

Credits: 2

Instruction: *2 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT – I

Introduction & Principles of Disaster Management: Nature - development, hazards and disasters; natural disasters - earth quakes, floods, fire, landslides, cyclones, tsunamis, nuclear; chemical dimensions and typology of disasters - public health disasters, national policy on disaster management

UNIT –II

Prevention Preparedness and Mitigation Measures: Prevention, preparedness & mitigation measures for various disasters, post disaster reliefs and logistics management, emergency support functions and their coordination mechanism, resources and material management, management of relief camp

UNIT– III

Risk and Vulnerability: Building codes and land use planning, social vulnerability, environmental vulnerability, macroeconomic management and sustainable development, climate change, risk rendition, financial management of disaster and related losses

UNIT - IV

Role of Technology in Disaster Management: Disaster management for infrastructures, taxonomy of infrastructure, treatment plants and process facilities, electrical sub stations, roads and bridges, geo spatial information in agriculture, drought assessment, multimedia technology in disaster risk management and training

UNIT-V

Disaster management in India: Disaster Profile of India – Mega Disasters of India and Lessons Learnt Disaster Management Act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management;

Suggested Readings:

1. Rajib shah and R.R Krishnamurthy, *Disaster management – Global Challenges and local solutions, Hyderabad*: Universities Press (India) Pvt. Ltd., 2009.
2. Satish Modh, *Introduction to Disaster management*, Bengaluru: Macmillan India Ltd., 2010

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B. Tech. (ECE) VII Semester

Open Elective-II (b)
OEII4108EE: NON-CONVENTIONAL ENERGY SOURCES

Credits: 2

Instruction: *2 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT-I

Review of Conventional and Non-Conventional energy sources - Need for non-conventional energy sources Types of Non- conventional energy sources - Fuel Cells - Principle of operation with special reference to H2O2 Cell - Classification and Block diagram of fuel cell systems - Ion exchange membrane cell - Molten carbonate cells - Solid oxide electrolyte cells - Regenerative system-Regenerative Fuel Cell - Advantages and disadvantages of Fuel Cells-Polarization - Conversion efficiency and Applications of Fuel Cells.

UNIT-II

Solar energy - Solar radiation and its measurements - Solar Energy collectors -Solar Energy storage systems - Solar Pond - Application of Solar Pond - Applications of solar energy.

UNIT-III

Wind energy- Principles of wind energy conversion systems - Nature of wind - Power in the Wind-Basic components of WECS -Classification of WECS -Site selection considerations -Advantages and disadvantages of WECS -Wind energy collectors -Wind electric generating and control systems - Applications of Wind energy -Environmental aspects.

UNIT- IV

Energy from the Oceans - Ocean Thermal Electric Conversion (OTEC) methods - Principles of tidal power generation -Advantages and limitations of tidal power generation -Ocean waves - Wave energy conversion devices -Advantages and disadvantages of wave energy - Geo-Thermal Energy - Types of Geo-Thermal Energy Systems - Applications of Geo-Thermal Energy.

UNIT-V

Energy from Biomass - Biomass conversion technologies / processes - Photosynthesis - Photosynthetic efficiency - Biogas generation - Selection of site for Biogas plant - Classification of Biogas plants - Details of commonly used Biogas plants in India - Advantages and disadvantages of Biogas generation -Thermal gasification of biomass -Biomass gasifiers.

Suggested Readings:

1. Rai G.D, *Non-Conventional Sources of Energy*, Khandala Publishers, New Delhi, 1999.
2. M.M. El-Wakil, *Power Plant Technology*. McGraw Hill, 1984.

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B. Tech. (ECE) VII Semester

Open Elective-II (c)
OEII4110HS: STARTUP ENTERPRENURSHIP

Credits: 2

Instruction: *2 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT – I

Creativity & Discovery: Definition of Creativity, self-test creativity, discovery and delivery skills, The imagination threshold, Building creativity ladder, Collection of wild ideas, Bench marking the ideas, Innovative to borrow or adopt, choosing the best of many ideas, management of tradeoff between discovery and delivery

UNIT – II

From Idea to Startup: Introduction to think ahead backward, Validation of ideas using cost and strategy, visualizing the business through value profile, activity mapping, Risks as opportunities, building your own road map

UNIT – III

Innovation career lessons: Growing & Sharing Knowledge, The Role of Failure In Achieving Success, Creating vision, Strategy, Action & Resistance: Differentiated Market Transforming Strategy; Dare to Take Action; Fighting Resistance; All About the startup Ecosystem; Building a Team; Keeping it Simple and Working Hard.

UNIT – IV

Action driven business plan: Creating a completed non-business plan, including a list of the activities to be undertaken, with degrees of importance. A revision of the original product or service idea, in light of information gathered in the process, beginning to design the business or organization that will successfully implement your creative idea.

UNIT – V

Startup financing cycle: Preparing an initial cash flow statement, showing money flowing out and flowing in. Estimate your capital needs realistically. Prepare a bootstrapping option (self-financing). Prepare a risk map. Prepare a business plan.

Suggested Readings:

1. Vasant Desai, "*Dynamics of Entrepreneurial Development and Management*", Himalaya Publishing House, 1997.
2. Prasanna Chandra, "*Project – Planning, Analysis, Selection, Implementation and Review*", Tata McGraw-Hill Publishing Company Ltd., 1995.
3. B. Badhai, "*Entrepreneurship for Engineers*", Dhanpath Rai & Co., Delhi, 2001.
4. Stephen R. Covey and A. Roger Merrill, "*First Things First*", Simon and Schuster, 2002.
5. Robert D. Hisrich and Michael P.Peters, "*Entrepreneurship*", Tata McGraw Hill Edition, 2002.

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B. Tech. (ECE) VII Semester

PC4111EC: MICROWAVE ENGINEERING LAB

Credits: 1

Instruction: *2 hours per week* **Duration of SEE:** *3 hours*
CIE: *25 marks* **SEE:** *50 marks*

List of Experiments

A. Microwave Source Characteristics

1. Reflex Klystron Characteristics
2. Gunn diode Characteristics

B. Waveguide, Component Characteristics

1. Measurement of standing wave pattern, VSWR measurement, Low & High VSWR measurements.
2. Measurement of Frequency, wavelength, group and phase velocity.
3. Measurement of an unknown load characteristics of windows.
4. Directional Coupler Characteristics, Coupling, Directivity, and Isolation Measurements.
5. E plane, H plane and Magic Tee characteristics.
6. Characteristics of Circulator, Isolator, Measurements of S-parameters through insertion loss and isolation.

C. Antenna Characteristics

1. Measurement of principle plane radiation patterns for horn, Yagi Uda, folded dipole.
2. Measurement of gain & input impedance.
3. Linear array characteristics.
4. Measurement of return loss with Vector Network Analyzer.

D. Optical Communication

1. Optical Transmitter & Receiver Characteristics (Source' & Detector).
2. Optical Fiber Characteristics: Attenuation, Numerical aperture, splicing losses (step & graded index).
3. Modulation & Demodulation Techniques.
4. Analog/Digital Transmission link characteristics.

Suggested Readings:

1. Samuel Y. Liao, "*Microwave Devices and Circuits*", PHI, 3rd Edition, 1994.
2. Pozar D.M., "*Microwave Engineering*", John Wiley & Sons 3 rd edition, 2005.

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B. Tech. (ECE) VII Semester

PW-I 4112EC PROJECT STAGE-1

Credits: 2

Instruction: *4 hours per week* **Duration of SEE***:*
CIE: *50 marks* **SEE:**

The department can initiate the project allotment procedure at the end of VI semester and finalize itin the first two weeks of VII semester.

The department will appoint a project coordinator who will coordinate the following:

Collection of project topics/ descriptions from faculty members (Problems can also be invited from the industries)
Grouping of students (max 3 in a group)Allotment of project guides

The aim of project work is to develop solutions to realistic problems applying the knowledge and skills obtained in different courses, new technologies and current industry practices. This requires students to understand current problems in their domain and methodologies to solve these problems. To get awareness on current problems and solution techniques, the first 4 weeks ofVII semester will be spent on special lectures by faculty members, research scholars, post graduate students of the department and invited lectures by engineers from industries and R&D institutions. After completion of these seminars each group has to formalize the project proposal based on theirown ideas or as suggested by the project guide

Seminar schedule will be prepared by the coordinator for all the students from the 5th week to thelast week of the semester which should be strictly adhered to.

Each group will be required to:

1. Submit a one page synopsis before the seminar for display on notice board.
2. Give a 30 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write-up on the talk.

At least two teachers will be associated with the Project Seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items stated above.

The seminar presentation should include the following components of the project:

1. Problem definition and specification
2. Literature survey
3. Broad knowledge of available techniques to solve a particular problem.
4. Planning of the work, preparation of bar (activity) charts
5. Presentation- oral and written.

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B. Tech. (ECE) VII Semester

SI-4113EC SUMMER INTERNSHIP

Credits:

Instruction: *6 weeks* *Duration of SEE: --*
CIE: *50 marks* *SEE: --*

Summer Internship is introduced as part of the curricula for encouraging students to work on problems of interest to industries. A batch of two or three students will be attached to a person from an Electronics Industry / R & D Organization / National Laboratory/Any other program approved by the department for a period of 8 weeks. This will be during the summer vacation following the completion of the VI semester course. One faculty member will act as an internal guide for each batch to monitor the progress and interacts with the industry guide.

After the completion of the project, students will submit a brief technical report on the project executed and present the work through a seminar talk to be organized by the department. Award of sessional are to be based on the performance of the student at the work place to be judged by industry guide and internal guide (25 Marks) followed by presentation before the committee constituted by the department (25 Marks). One faculty member will co- ordinate the overall activity of Summer Internship.

***Students have to undergo summer internship of 6 Weeks duration at the end of semester VI andcredits will be awarded after evaluation in VII semester**

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B. Tech. (ECE) VIII Semester

S. No.	Course Code	Course Title	Scheme of Instruction			Lecture Hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1.	PE-VI	Professional Elective-VI	4	0	0	4	30	70	4
2.	OE-III	Open Elective-III	2	0	0	2	30	70	2
3.	PW4209EC	Project Stage-II	0	0	12	12	50	100	6
4.	MC-42aHS/42bHS	NSS/Yoga	2	0	0	2	30	0	0
Total			8	0	12	20	140	240	12

L Lecture
T Tutorial
P Practical
CIE Continuous Internal Evaluation
SEE Semester End Examination
PC Professional core

Professional Elective-VI

PEVI4201EC	Wireless Sensor Networks
PEVI4202EC	Signal Processing for AI & ML
PEVI4203EC	System on chip Design
PEVI4204EC	Optimization Techniques

Open Elective-III

OEIII4205CS	Information Security
OEIII4206HS	IPR and Patenting
OEIII4208HS	Human Values and Professional Ethics

Mandatory Course:

MC42aHS	NSS
MC42bHS	Yoga

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B. Tech. (ECE) VIII Semester

Professional Elective-IV (a)
PEIV4201EC: WIRELESS SENSOR NETWORKS

Credits: 4

Instruction: *4 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT - I

Introduction: Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.

UNIT - II

Introduction to adhoc/sensor networks: Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, drivling applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.

UNIT - III

MAC Protocols : Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.

UNIT - IV

Routing Protocols: Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols

UNIT - V

QoS and Energy Management: Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.

Suggested Readings:

1. C. Siva Ram Murthy, and B. S. Manoj, "*AdHoc Wireless networks* ", Pearson Education - 2008.
2. Feng Zhao and Leonides Guibas, "*Wireless sensor networks* ", Elsevier publication - 2004.
3. Jochen Schiller, "*Mobile Communications*", Pearson Education, 2nd Edition, 2003.
4. William Stallings, "*Wireless Communications and Networks* ", Pearson Education – 2004
5. Holger Karl and Andreas Willing, *"Protocols and Architectures for Wireless Sensor Networks"*, John Wiley and Sons, 2005.

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B. Tech. (ECE) VIII Semester

Professional Elective-IV (b)
PEIV4202EC: SIGNAL PROCESSING FOR AI&ML

Credits: 4

Instruction: *4 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT - I

Brief review of vectors and matrices, properties of eigenvalue decomposition and singular value decomposition (SVD), applications of SVD; Brief review of signal processing concepts: Applications of filtering and extraction.

UNIT - II

Introduction to Artificial Intelligence, Problem formulation, Problem Definition - Problem characteristics, Problem solving methods , Control strategies, Search strategies, Heuristic searching techniques

UNIT - III

Introduction to Machine learning: Definition of learning systems; Designing a learning system, Goals and applications of machine learning; Classification of learning system, supervised learning, unsupervised learning, reinforcement learning.

UNIT - IV

Basics of Principal component analysis, support vector machines, linear regression, k-means clustering algorithm, Baysian learning approach. (Qualitative Treatment only)

UNIT - V

Applications of AI & ML in signal processing, wireless communications and image processing; use of IOT and AI in 5G communication systems. (Qualitative Treatment only)

Suggested readings:

1. Kevin Night and Elaine Rich, Nair B., "*Artificial Intelligence (SIE)*", Mc Graw Hill- 2008.
2. Dan W. Patterson, "*Introduction to AI and ES*", Pearson Education, 2007.
3. Stuart Russel and Peter Norvig "*AI – A Modern Approach*", 2nd Edition, Pearson Education 2007.
4. Tom M. Mitchell, *Machine Learning*, MGH, Indian Edition, ISBN 1259096955, 2013.
5. Jason Bell, *Machine Learning: Hands-On for Developers and Technical Professionals*, John Wiley & Sons, 1st ed., ISBN-13: 978-1118889060, 2014.

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B. Tech. (ECE) VIII Semester

Professional Elective-VI (c)
PEVI4203EC: SYSTEM ON CHIP DESIGN

Credits: 4

Instruction: *4 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT – I

Introduction to System on Chip: System Architecture components of the system, hardware and Software, processor architecture, memory and addressing, system level interconnection, an Approach for SOC design, system architecture and complexity.

UNIT – II

Processor design: Processor architecture and organization, processor design trade-offs, the Reduced instruction set computer, the acron risc machine, architectural inheritance, the arm Programmers model, arm development tools.

UNIT – III

Organization of an SoC*:* 3-stage pipeline arm organization, 5-stage pipeline arm organization, the arm coprocessor interface coprocessor instructions, data operations, data transfers, the thumb bit in the cpsr, the thumb programmer's model

UNIT – IV

Architectural support for system development: The arm memory interface, the advanced micro controller bus architecture (amba), the arm reference peripheral specification, hardware system prototyping tools, the armulator, the jtag boundary scan test architecture embedded trace, signal processing support.

UNIT – V

Memory hierarchy: Memory size and speed: memory cost, on chip memory, caches: processor & Memory speeds, unified & Harvard caches, cache performance metrics, the direct mapped Cache the set-associative cache, the fully associative cache, write strategies cache design-an example.

Suggested readings:

1. Steve furber, "*arm system-on-chip architecture*", second edition, pearson publications
2. Andrewn.sloss, domnic symes,chris wright, "*arm system developers guide*", publications Elsevier.

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B. Tech. (ECE) VIII Semester

Professional Elective-VI (d)
PEVI4204EC: OPTIMIZATION TECHINIQUES

Credits: 4

Instruction: *4 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

Unit-I

Introduction: Statement of an optimization problem, Classification of optimization problems, Overview of various optimization Techniques, Properties of vectors, norms, positive semi-definite matrices.

Unit-II

Classical optimization techniques: Single variable optimization, Multivariable optimization, Convexity and concavity of functions of one and two variables, convex optimization problems, the simplex optimization technique, Test Functions.

Unit-III

Unconstrained optimization: General properties of minimization algorithms, Line search, the gradient method, Newton's method, least square Algorithm. Constrained optimization: Active constraints versus inactive constraints, transformations

Unit-IV

Genetic algorithm (GA): Fundamentals of Genetic algorithm, History, Basic concepts, working principle, Applications of GA.

Swarm intelligence: Basic particle swarm optimization, initialization techniques, Theoretical investigations and parameter selection, Design of PSO algorithm using computational statistics, Application of PSO.

Unit-V

Differential Evolution: Classical differential evolution- An outline, Mutation, cross over, selection, Teaching learning based optimization (TLBO), applications of TLBO for standard Bench mark test functions.

Suggested Readings:

1. Richard W Daniels, An Introduction to Numerical Methods and Optimization Techniques, Elsevier North Holland Inc,
2. S Rajasekharan, G.A Vijaya Lakshmi Pai, Neural Networks, Fuzzy logic, and Genetic algorithms, Synthesis and Applicationlls, Prentice hall of India, 2007
3. Rao, S.S., "*Engineering Optimization: Theory and Practice*", John Wiley & Sons, Inc., 2009
4. Taha, H.A., "*Operations Research, Pearson Education India*", New Delhi, India, 2008.
5. Randy L. Haupt and Sue Ellen Haupt, "*Practical genetic algorithms*" second edition, a John Wiley & sons, inc., publication -2004.

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B. Tech. (ECE) VIII Semester

Open Elective-III (a)
OEIII4205CS: INFORMATION SECURITY

Credits: 2

Instruction: *2 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT – I

Introduction: Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, Threats, a model for Network Security.

UNIT – II

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques (mono-alphabetic cipher, poly-alphabetic, one-time pad) encryption and decryption, symmetric and asymmetric key cryptography, key range and key size

UNIT – III

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, RC4), Key distribution in symmetric system

UNIT – IV

Asymmetric key Ciphers: Principles of public key crypto systems, Public key Algorithms: RSA, Diffie-Hellman, ECC, Key Distribution Key in asymmetric system.

UNIT – V

Authentication: Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure Hash Algorithm-1, Digital signatures, MD5.

Suggested Readings:

1. *Cryptography and Network Security* : William Stallings, Pearson Education,4"' Edition
2. *Information Security, Principles and Practice: Mark Stamp*, Wiley India.
3. *Cryptography and Network Security:* C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India,1"Edition.
4. *Cryptography and Network Security :* Forouzan Mukhopadhyay, MC Graw Hill, 2"" Edition.
5. *Cryptography and Network Security :* Atul Kahate, Mc Graw hill Edition.
6. *Introduction to Network Security:* Neal Krawetz, CENGAGE Learning.

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B. Tech. (ECE) VIII Semester

Open Elective-III (b)
OEIII4206HS: IPR AND PATENTING

Credits: 2

Instruction: *2 hours per week* **Duration of SEE:** *3 hours*
CIE: *30 marks* **SEE:** *70 marks*

UNIT-I

Introduction to intellectual property Act and Law-the evolutionary past-the IPR tool kit- legal tasks in intellectual property law-ethical obligations in Para legal tasks in intellectual property law

UNIT-II

Introduction to trade mark – Trade mark registration process-Post registration procedures-Trade mark maintenance – transfer of rights-inter party's proceeding – Infringement-Dilution ownership of trade mark-likelihood of confusion – trademark claims- trademark litigations

UNIT-III

Introduction to copy rights- principles of copyright – subjects matter of copy right- rights afforded by copyright law- copyright ownership transfer and duration – right to prepare derivative works-right of distribution- right to perform the work publicity- copyright formalities and registrations

UNIT-IV

Introduction to patent law- Rights and limitations- Rights under patent law- patent requirements-ownership – transfer- patent application process- patent infringement- patent litigation

UNIT-V

Introduction to transactional law- creating wealth and managing risk – employment relationship in the Internet and technologic cal sector-contact for internet and technological sector

Suggested Readings:

1. Kompal Bansal and Praishit Bansal, "*Fundamentals of IPR for Engineers*", 1st Edition, BS Publications, 2012.
2. Prabhuddha Ganguli, "*Intellectual Property Rights*", 1st Edition, TMH, 2012.
3. R Radha Krishnan & S Balasubramanian, "*Intellectual Property Rights*", 1st Edition, Excel Books, 2012.
4. M Ashok Kumar & mohd Iqbal Ali,"*Intellectual Property Rights*", 2nd Edition, Serial publications, 2011.

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B. Tech. (ECE) VIII Semester

Open Elective-III (c)
OE-III 4208HS: HUMAN VAUES AND PROFESSIONAL ETHICS

Credits: 2

Instruction: 2 hours per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*

UNIT – I

Human Values: Morals, values & ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty, courage, valuing time, co- operation, commitment, empathy, self-confidence, character, spirituality

UNIT – II

Engineering Ethics: Senses of Engineering Ethics, variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, moral theories, Engineering as social experimentation: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study

UNIT –III

Safety, Responsibilities and Rights: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, professional rights, employee rights, Whistle blowing

UNIT – IV

Collegiality-Techniques for Achieving Collegiality –Two Senses of Loyalty- obligations of Loyalty-misguided Loyalty – professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self-interest, Customs and Religion- Ethical egoism-Collective bargaining

UNIT –V

Global Issues: Multinational corporations - environmental ethics, computer ethics, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of ethics, Ethics and codes of business conduct in MNC

Suggested Readings:

1. D.R. Kiran, *Professional Ethics and Human Values*, New York: McGraw Hill, 2013.
2. Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Professional Ethics and Human Values*, New Delhi: Prentice Hall of India, 2013.
3. Mike Martin and Roland Schinzinger, *Ethics in Engineering*, 4th ed. New York: McGraw Hill, 2014.
4. Charles D. Fleddermann, *Engineering Ethics*, 4th ed. New Delhi: Prentice Hall, 2004.

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B. Tech. (ECE) VIII Semester

PW4209EC PROJECT STAGE - II

Credits: 6

Instruction: 12 hours per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 100 marks*

The aim of project work –II is to implement and evaluate the proposal made as part of project work–I. Students can also be encouraged to do full time internship as part of project work-II based onthe common guidelines for all the departments. The students placed in internships need to write the new proposal in consultation with industry coordinator and project guide within two weeks from the commencement of instruction.

The department will appoint a project coordinator who will coordinate the following:

1. Re-grouping of students - deletion of internship candidates from groups made as part of project work-I
2. Re-Allotment of internship students to project guides
3. Project monitoring at regular intervals

All re-grouping/re-allotment has to be completed by the 1st week of VIII semester so that students get sufficient time for completion of the project.

All projects (internship and departmental) will be monitored at least twice in a semester through student presentation for the award of sessional marks. Sessional marks are awarded by a monitoring committee comprising of faculty members as well as by the supervisor. The first review of projects for 25 marks can be conducted after completion of five weeks. The second review for another 25 marks can be conducted after 12 weeks of instruction.

Common norms will be established for the final documentation of the project report by the respective departments. The students are required to submit draft copies of their project report within one week after completion of instruction.

Note: Three periods of contact load will be assigned to each project guide.

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B. Tech. (ECE) VIII Semester

MC42aHS: NSS

Credits: 0

Instruction: 2 hours per week *Duration of SEE: -*
CIE: 30 marks *SEE: -*

List of Activities:

1. Orientation programme about the role of NSS in societal development.
2. Swachh Bharat Program.
3. Guest lectures from eminent personalities on personality development.
4. Plantation of saplings/Haritha Haram Program.
5. Blood Donation / Blood Grouping Camp.
6. Imparting computer education to school children.
7. Creating Awareness among students on the importance of Digital transactions.
8. Stress management techniques.
9. Health Check-up Activities.
10. Observation of Important days like Voters' day, World Water Day and so on.
11. Road Safety Awareness Programs.
12. Energy Conservation Activities
13. Conducting Programs on effective communication skills
14. Awareness programs on national integration.
15. Orientation on Improving Entrepreneurial Skills.
16. Developing Effective Leadership skills.
17. Job opportunity awareness programs in various defense, public sector undertakings.
18. Skill Development Program.
19. Creating awareness among students on the Importance of Yoga and other physical activities.
20. Creating awareness among students on various government sponsored social welfare schemes for the people.

Note: At least Ten Activities should be conducted in the Semester**.** Each event conducted under Swachh Bharat, Plantation and important days like Voters' day, world water day may be treated as a separate activity

Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) VIII Semester

MC42b: YOGA

Credits: 0

Instruction: 2 hours per week *Duration of SEE: -*
CIE: 30 marks *SEE: -*

UNIT – I

Introduction: Yoga definition, health definition from WHO, yoga versus health, basis of yoga, yoga is beyond science, Gist of eighteen chapters of Bhagavad-Gita, four types of yoga: Karma, Bhakti, Gnyana andRaja yoga, Internal and External yoga, elements of Ashtanga yoga (Yama, Niyama, Asana, Pranayama,Prathyahara, Dharana, Dhyana and Samadhi), Panchakoshas and their purification through Asana,Pranayama and Dhyana.

UNIT – II

Suryanamaskaras (Sun Salutations): Definition of sun salutations, seven chakras (Mooladhaar, Swadhishtaan, Manipura, Anahata, Vishuddhi, Agnya and Sahasrar), various manthras (Om Mitraya, Om Ravaye, Om Suryaya, Om Bhanave, Om Marichaye, Om Khagaye, Om Pushne, Om HiranyaGarbhaye, OmAdhityaya, Om Savitre, Om Arkhaya, and Om Bhaskaraya) and their meaning while performing sun salutations, physiology, seven systems of human anatomy, significance of performing sun salutations.

UNIT – III

Asanas (Postures): Pathanjali's definition of asana, sthiramsukhamasanam, 3rd limb of Ashtanga yoga, loosening or warming up exercises, sequence of perform in asanas (standing, sitting, prone, supine and inverted), nomenclature of asanas (animals, trees, rishis and so on), asanas versus chakras, asanas versus systems, asanas versus physical health, activation of Annamayakosha.

UNIT – IV

Pranayama (Breathing Techniques): Definition of Pranayama as per Shankaracharya, 4th limb of Ashtanga yoga, various techniques of breathing, Pranayama techniques versus seasons, bandhas and their significance in Pranayama, mudras and their significance in Pranayama, restrictions of applying bandhas with reference to health disorders, Pranayama versus concentration, pranayama is the bridge between mindand body, pranayam versus mental health, activation of Pranamayakosha through Pranayama.

UNIT – V

Dhyana (Meditation): Definition of meditation, 7th limb of Ashtanga yoga, types of mind (Conscious andSub-Conscious), various types of dhyana. Meditation versus spiritual health, Dharana and Dhyana, extentionof Dhyana to Samadhi, Dhyana and mental stress, activation of Manomayakosha through dhyana, silencingthe mind.

Suggested Readings:

1. *Light on Yoga* by BKS lyengar.
2. *Yoga Education for Children,* Vol-1 by Swami SatyanandaSaraswati.
3. *Light on Pranayama* by BKS lyengar.
4. *Asana Pranayama Mudra and Bandha*by Swami SatyanandaSaraswati.
5. *Hatha Yoga Pradipika*by Swami Mukhtibodhananda.
6. *Yoga education for children,* Vol-11 by Swami NiranjanandaSaraswati.
7. *Dynamics of Yoga* by Swami SatyanandaSaraswati.