UNIVERSITY OF DELHI

DEPARTMENT OF ELECTRONICS

4 YEAR UNDERGRADUATE PROGRAMME

(Courses effective from Academic Year 2013-14)

SYLLABUS OF COURSES TO BE OFFERED

RESTRUCTURED FOUR YEAR BTECH UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-1 (Core Papers)		**Semester-II (Core Papers)**	
EL- 101	Network Analysis	EL- 201	Semiconductor Devices
EL- I02	Applied Physics	EL- 202	Engineering Mathematics-I
Foundation Courses A1/AGIL Language, Literature & Creativity I (Hindi)/Indian Literature A2 Information Technology A3 Science & Life A4 Applied Course (English/Hindi (AGH)) IMBH Integrated Mind Body and Heart B1 Language, Literature & Creativity-II (English) B2 Building Mathematical Ability B3 History Culture & Civilization B4 Business Entrepreneurship			
Semester-III		**Semester-IV**	
EL-301 **(Core)**	Analog Electronics-I	EL-401 **(Core)**	Analog Electronics-II
EL-302 **(Core)**	Digital System Design	EL-402 **(Core)**	Electronic Instrumentation
EL-303 **(Core)**	C++ & Data Structures	EL-403 **(Core)**	Signals & Systems
DC-II (Chemistry) **(Basic Science)**	Chemical Bonding	DC-II (Physics) **(Basic Science)**	Electricity and Magnetism
Semester-V		**Semester-VI**	
EL- 501 **(Core)**	Microprocessors	EL-601 **(New Core Paper)**	***Embedded Systems****
EL-502 **(Core)**	Electromagnetic Waves & Transmission Lines***	EL-602 (**New Core Paper)**	***Control Systems****
EL-503 **(Core)**	Communication Electronics	EL-603 **(Core)**	Engineering Mathematics-II
DC-II (Mathematics) **(Basic Science)**	Numerical Methods	EL-604 (**New Allied Eng. Course)**	***Digital Signal Processing****
Semester-VII		**Semester-VIII**	
EL-701 **(New Core Paper)**	***Power Electronics****	EL-801	Semiconductor Fabrication & Characterization
EL-702	Photonics	EL-802	Modern Communication System
EL-703 **(New Allied Eng. Course)**	***Computer Networks****	EL-803 **(New Allied Eng. Course)**	***Electrical Technology*8***
	Project		Project and Dissertation

***New Core Papers:** Power Electronics, Embedded Systems and Control Systems

****New Allied Engineering Courses:** Digital Signal Processing, Computer Networks and Electrical technology

*****Electromagnetic Waves & Transmission Lines (EL-502) :** This course is modified and relocated.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-I

Core Paper
Total Periods: 48

Network Analysis

Unit-1 (P-15)

Basic Circuit Concepts: Voltage and Current Sources, Resistance, Capacitance, Inductance, Series and Parallel Elements, Voltage Division And Current Division.

Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis, Mesh Analysis, Star-Delta Conversion.

Network Theorems: Principal Of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem.

Unit-2 (P-11)

DC Transient Analysis : Solving Differential Equations, Initially Charged RC Circuit, RL Circuit With Initial Current, Time Constant, RL and RC Circuits With Sources, DC Response of Series RLC Circuits (Using Differential Equations).

Unit-3 (P-16)

AC Circuit Analysis: Sinusoidal Voltage And Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current Relationship in Resistor, Inductor and Capacitor. Phasor, Complex Impedance, Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor. Sinusoidal Circuit Analysis For RL, RC And RLC Circuits. Mesh Analysis, Node Analysis and Network Theorems For AC Circuits.

Resonance in Series and Parallel RLC Circuits, Frequency Response of Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth. Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

Unit-4 (P-6)

Two Port Networks: Impedance (Z) Parameters, Admittance (Y) Parameters, Transmission (ABCD) Parameters, Hybrid (H) Parameters.

Essential Text:

Unit-1

Chapter 2, 3, 4 & 5 M. Nahvi and J. Edminister, Electric circuits, Schaum's outline series, Tata McGraw Hill (2010)

Chapter 1 & 2, John. D. Ryder, Networks, Lines and Fields, Prentice Hall of India (2002)

Unit-2

Chapter 7& 8 M. Nahvi and J. Edminister, Electric circuits, Schaum's outline series, Tata McGraw Hill (2010)

Chapter 7& 8 C. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2008) Unit-3

Chapter 9, 10 &12 M. Nahvi and J. Edminister, Electric circuits, Schaum's outline series, Tata McGraw Hill (2010)

Chapter 9, 10 & 11 C. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2008)

Unit-4

Chapter 13 M. Nahvi and J. Edminister, Electric circuits, Schaum's outline series, Tata McGraw Hill (2010)

Chapter 19 C. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2008)

Suggested books:

1.S. A. Nasar, Electric Circuits, Schaum's outline series, Tata McGraw Hill (2004)
2. Robert L. Boylestad, Essentials of Circuit Analysis, Pearson Education (2004)
3. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill(2005)

Network Analysis (Practicals)

(At Least Any FIVE and Software Simulation (Using Pspice/Multisim) of Any Two)

1. Verify the Thevenin, Norton and Superposition Theorem.
2. Verify the Maximum Power Transfer Theorem.
3. RC Circuits: Time Constant, Differentiator, Integrator.
4. Design a Low Pass RC Filter and Study its Frequency Response.
5. Design a High Pass RC Filter and Study its Frequency Response.
6. To Study the Generation of Lissajous Figures.
7. To Measure the Z-Parameters of a Two-Port Network.
8. To Study the Frequency Response of a Series LCR Circuit and Determine its (a) Resonant Frequency (b) Impedance at Resonance (c) Quality Factor Q (d) Band Width.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

Applied Physics **Total Periods: 48**

Unit-1 (P -11)

Thermal Properties: Brief Introduction to Laws Of Thermodynamics, Concept of Entropy, Concept of Phonons , Heat Capacity, Debye's Law, Lattice Specific Heat, Electronic Specific Heat, Specific Heat Capacity for Si fnd Ga As, Thermal Conductivity, Thermoelectricity: Seebeck Effect, Thomson Effect, Peltier Effect.

Unit-2 (P -11)

Mechanical Properties of Materials: Elastic and Plastic Deformations, Hooke's Law, Elastic Moduli, Brittle and Ductile Materials, Tensile Strength, Theoretical and Critical Shear Stress of Crystals. Strengthening Mechanisms, Hardness, Creep, Fatigue, Fracture

Unit-3 (P -11)

Waves and Oscillations: Free Oscillations of Simple System: Pendulum, Mass and Spring, Longitudinal Oscillations, Mass and Spring Transverse Oscillation, LC Circuit, Forced Oscillations, Resonance.
One Dimensional Wave Equation and Phase Velocity, Types of Wavefront: Plane, Spherical and Cylindrical, Standing Wave, Dispersion in Waves, Group Velocity, Properties of Waves: Interference, Reflection ,Refraction, Polarisation and Diffraction.

Unit -4 (P-15)

Quantum Mechanics: Failure of Classical Physics, Compton Effect , Pair Production De-Broglie Relation, Probabilistic Interpretation of Waves, Conditions for Physical Acceptability of Wave Functions. Schrodinger Wave Equation for a Free Particle and in a Force Field (1 Dimension), Boundary and Continuity Conditions. Operators in Quantum Mechanics, Conservation of Probability, Time-Dependent Form, Linearity and Superposition, Operators, Time-Independent One Dimensional Schrödinger Wave Equation, Stationary States, Eigen-Values and Eigen- Functions. Hydrogen Atom.

Essential Text:

Unit1

Chapter 6-m. S. Vijaya and G. rangarajan, material science, tata mcgraw hill
(2003) Unit 2
Chapter 9- w. E. Callister, material science and engineering: an introduction, wiley india
(2006) Unit 3
Chapters 1, 5, 6, A.P. French, ―vibrations and waves, the m.i.t. Introductory physics series.
Chapters 1, 2, 3, 5, 12- H.J. Pain, ―the physics of vibrations and waves, wiley
Unit 4
Chapters 2, 3, 5, 6-beiser-concepts of modern physics, tmh

Suggested Books:

1. A. J. Dekker, Electrical Engineering Materials, Prentice Hall India (2009)
2. A. J. Dekker, Solid State Physics, Macmilan (2003)
3. C. Kittel, Introduction to Solid State Physics, Wiley (1996)
4. W. E. Callister, Material Science and Engineering: An Introduction, Wiley India (2006)
5. M. S. Vijaya and G Rangarajan, Material Science, Tata Mcgraw Hill (2003)
6. H.J. Pain, ―The Physics of Vibrations and Waves, Wiley.
7. A.P. French, ―Vibrations And Waves, The M.I.T. Introductory Physics Series.

8. Beiser, ―Perspective of Modern Physics, TMH.

Applied Physics (Practicals)

1. Measurement of Specific Heat of Materials.
2. Measurement of Tensile Strength of Materials.
3. Study of Hooke's Law.
4. To Determine the Coefficient of Thermal Conductivity of Copper By Searle's Apparatus or By Angstrom's Method.
5. To Determine the Coefficient of Thermal Conductivity of a Bad Conductor by Lee and Charlton's Disc Method.
6. Study of Seebeck Effect

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-II

Core Paper

Semiconductor Devices **Total Periods: 48**

Unit -1 (P-12)

Semiconductor Basics: Introduction to Semiconductor Materials, Crystal Structure, Planes and Miller Indices, Energy Band in Solids, Concept of Effective Mass, Density of States, Carrier Concentration at Normal Equilibrium in Intrinsic Semiconductors, Derivation of Fermi Level for Intrinsic & Extrinsic Semiconductors, Donors, Acceptors, Dependence of Fermi Level on Temperature and Doping Concentration, Temperature Dependence of Carrier Concentrations.

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

Unit- 2 (P-12)

P-N Junction Diode:, Formation of Depletion Layer, Space Charge at a Junction, Derivation of Electrostatic Potential Difference at Thermal Equilibrium, Depletion Width and Depletion Capacitance of an Abrupt Junction. Concept of Linearly Graded Junction, Derivation of Diode Equation and I-V Characteristics .Charge Storage and Transient Behavior, Zener and Avalanche Junction Breakdown Mechanism. Brief Description of Solar Cell.

Unit -3 (P-12)

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

Uni-Junction Transistor (UJT): Construction, Working and I-V Characteristics of UJT. Semiconductor Controlled Rectifier (SCR)- Construction, Doping Profile, Working and I-V Characteristic, Two Transistor Model and Triggering Mechanisms.

Unit-4 (P-12)

Metal Semiconductor Junctions: Ohmic & Rectifying Contacts.

Junction Field Effect Transistor (JFET): Construction of JFET, Idea of Channel Formation, Pinch-Off and Saturation Voltage, Current-Voltage Output Characteristics.

Metal Oxide Field Effect Transistor (MOSFET): The Ideal MOS Diode, Accumulation, Depletion and Inversion, Basic Construction of MOSFET and Working, I-V Characteristics, Enhancement and Depletion Modes. Complimentary MOS (CMOS).

Essential Text:

Unit-1: Chapter 2 & 3 of S. M. Sze, Semiconductor Devices: Physics and Technology,2nd Edition,Wiley India edition (2002).

Unit-2**:** Chapter 4 of S. M. Sze, Semiconductor Devices: Physics and Technology,2nd Edition,Wiley India edition (2002).

Unit-3: Chapter 5 of S. M. Sze, Semiconductor Devices: Physics and Technology,2nd Edition,Wiley India edition (2002).

Unit-4: Chapter 6 & 7 of S. M. Sze, Semiconductor Devices: Physics and Technology,2nd Edition,Wiley India edition (2002).

Suggested Books:

1. Ben G Streetman and S. Banerjee, Solid State Electronic Devices, Pearson Education (2006)
2. Dennis Le Croissette, Transistors, Pearson Education (1989)
3. Jasprit Singh, Semiconductor Devices: Basic Principles, John Wiley and Sons (2001)
4. Kanaan Kano, Semiconductor Devices, Pearson Education (2004)
5. Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education (2006)

Electronics Practical Based On Semiconductor Devices (At Least Five Practical To Be Performed In Hardware And Software.)

1. To Study the I-V Characteristics of Diode – Ordinary and Zener Diode.
2. To Study the I-V Characteristics of the Common Emitter Configuration of BJT and Obtain the H-Parameters.
3. To Study the I-V Characteristics of the Common Base Configuration of BJT and Obtain the H-Parameters.
4. To Study the I-V Characteristics of the Common Collector Configuration of BJT and Obtain the H-Parameters.
5. To Study the I-V Characteristics of the UJT.
6. To Study the I-V Characteristics of the SCR.
7. To Study the I-V Characteristics of the Common Source FET Configuration.
8. To Study the I-V Characteristics of the Common Drain FET Configuration.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper
Total Periods: 48

Engineering Mathematics-1

Unit-1 (P-12)

Vector Differential Calculus: Scalar and Vector, Vector Differentiation, Directional Derivative, Gradient of a Scalar Function and Conservative Field, Divergence, Curl, Related Properties of Gradient, Divergence and Curl of Sums, Second-Order Differential Operator, Cylindrical and Spherical Coordinates.
Vector Integral Calculus: Vector Integration: Integration of a Vector Function of a Scalar argument, Line Integrals: Work Done, Potential, Conservative field and Area, Surface Integrals: Surface area and Flux, Volume integrals, Green's Theorem in a Plane: Transformation between Line integral and Double integral Area in Cartesian and Polar Coordinates, Stokes's Theorem, Gauss Divergence Theorem.

Unit-2 (P -12)

Matrices: Introduction to Matrices, System of Linear Algebraic Equations, Gaussian Elimination Method, Gauss-Seidel Method, LU decomposition, Solution of Linear System of LU decomposition
Eigen Values and Eigen Vectors: Linear Transformation, Eigen Values and Eigen Vectors, Properties of Eigen Values and Eigen Vectors, Cayley-Hamilton Theorem, Diagonalization. Powers of a Matrix.
Real and Complex Matrices: Real Matrices: Symmetric , Skew Symmetric , Orthogonal Quadratic Form, Complex Matrices: Hermitian, Skew Hermitian, Unitary Matrices

Unit-3 (P -12)

Sequences and series: Sequences, Limit of a sequence, Convergence, Divergence and Oscillation of a sequence, Infinite series, Necessary condition for Convergence, Cauchy's Integral Test, D'Alembert's Ratio Test, Cauchy's nth Root Test, Alternating Series Leibnitz's Theorem, Absolute Convergence and Conditional Convergence, Power Series .

Unit-4 (P -12)

Complex Functions: Complex Function, Continuity, Differentiability, Analyticity,
Cauchy-Riemann (C- R) Equations: In Cartesian Coordinates, Harmonic and Conjugate Harmonic Functions,
Elementary Complex Functions: Exponential Function, Trigonometric Functions, Hyperbolic Functions.
Complex Integration: Line Integral in Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivative of Analytic Functions.
Complex Power Series: Sequences, Series and Power Series, Taylor's Series , Laurent Series, Zeroes and Poles. Residue integration method, Residue integration of real Integrals.

Essential text:
Unit1
Chapter 1, 2, 3, 4, 5, 6, 7-Murray. R. Spiegel-vector analysis-Shaum Series, TMH
Unit 2
Chapter 7,8,20 E. Kreyszig, advanced engineering mathematics, wiley india (2008)
Unit 3
Chapter 10-B. V. Ramana, higher engineering mathematics, tata mcgraw hill publishing company limited (2007)
Unit 4
Chapters 13, 14, 15, 16- E. Kreyszig, advanced engineering mathematics, wiley india (2008)

Suggested Books

1.. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Limited (2007)
2. Murray. R. Spiegel-Vector Analysis-Shaum series, TMH
3. R. K. Jain, and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House (2007)
4. lC .R. Wylie and L. C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill (2004)

Engineering Mathematics –I (Matlab Based Practicals)

1. Find the convergence of a given series.
2. Find the divergence of a given series.
3. Solve the given matrix using Gauss Elimination method.
4. Solve the given matrix using Gauss – Seidel method.
5. Solve the given matrix using L-U decomposition method.
6. Solve the double integral using numerical methods.
7. Find curl of a given vector.
8. Find divergence of a given vector.
9. Find surface area of a plane using Stoke's theorem.
10. Solve problems using Gauss divergence theorem.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-III

Core Paper

Analog Electronics-I **Total Periods: 48**

Unit- 1 (P -12)

Diode Circuits: Ideal diode, piecewise linear equivalent circuit, dc load line analysis, Quiescent (Q) point. Positive, negative and biased clipper circuits clamping circuits. Half wave rectifier, center tapped and bridge full wave rectifiers, calculation of efficiency and ripple factor.

DC power supply: Block diagram of a power supply, qualitative description of shunt capacitor filter, Zener diode as voltage regulator, temperature coefficient of Zener diode.

Unit- 2 (P -12)

The BJT: Transistor as an amplifier and its operation in different configurations: Common Base (CB), Common Emitter (CE) and Common Collector (CC) , hybrid parameters, regions of operation, dc load line, Q point.

CE amplifier: Self bias arrangement of CE, dc and ac load line analysis. Stability factors S, S', S''. Hybrid equivalent of CE, Quantitative study of the frequency response of CE amplifier, effect on gain and bandwidth for cascaded CE amplifier (RC coupled).

Unit -3 (P -12)

Feedback Amplifiers: Concept of feedback, negative and positive feedback, Negative feedback: advantages and disadvantages of negative feedback, voltage (series and shunt), current (series and shunt) feedback amplifiers, derivation of gain, input and output impedances for feedback amplifiers. Positive feedback: Barkhausen criteria for oscillations, Study of phase shift oscillator, Colpitts oscillator and Crystal oscillator.

Unit- 4 (P -12)

The JFET: Different regions of operation, small signal equivalent circuit, Common Source amplifier circuit analysis.

Power Amplifiers: Classification of power amplifiers: A, B, C and AB, analysis of Class B push pull amplifiers (efficiency, power dissipation).

Single tuned amplifiers.

Essential Text:

Unit-1

Chapter-4 , J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001); Chapter-15, R. L. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, Pearson Education 10th Edition (2009)

Unit-2

Chapter-9 J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001); Chapter-4, R. L. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, Pearson Education 10th Edition (2009)

Chapter-15 A.Mottershead, Electronic Devices and Circuits, PHI

Unit-3

Chapter-5 ,John D Ryder ,Electronic Fundamental and applications,Vth Edition .PHI, New Delhi. Chapter-14, R. L. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, Pearson Education, 10th Edition (2009)

Unit-4

Chapter-18 ,J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001); Chapter-12, R. L. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, Pearson Education 10th Edition 2009)

Suggested Books:

1. D. L. Schilling and C. Belove, Electronic Circuits: Discrete and Integrated, Tata McGraw Hill (2002)
2. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill (2002)
3. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
4. J. R. C. Jaegar and T. N. Blalock, Microelectronic Circuit Design, Tata McGraw Hill (2010)
5. J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)
6. John Ryder, Electronic Devices , V Edition
7. Mottershed, Electronic Devices

Practical based on Analog Electronics-I

(At least five experiments to be performed on hardware and software)

1. To study the half wave rectifier and Full wave rectifier.
2. To study power supply using C filter and Zener diode.
3. To study clipping circuits
4. To study clamping circuits
5. To study Fixed Bias, Voltage divider and Collector-to-Base bias Feedback configuration for transistors.
6. To design a Single Stage CE amplifier.
7. To study Class A, B and C Power Amplifier.
8. To study the Colpitt's Oscillator.
9. To study the Phase Shift Oscillator
10. To study the frequency response of Common Source FET amplifier.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

Digital System Design **Total Periods: 48**

Unit-1 (P -14)

Number System and Codes: Decimal, Binary, Hexadecimal, Octal, BCD, conversion of one code to another, Complements (one's and two's), Signed and Unsigned numbers, Addition, Subtraction, Multiplication. Gray and Hamming Codes.

Logic Gates and Boolean algebra: Truth Tables, OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Boolean Theorems, DeMorgan's Theorems, Principle of duality.

Digital Logic families: Fan- in, Fan out, Noise Margin, Power Dissipation, Figure of merit, Speed power product, Current and Voltage parameters. TTL, MOS and CMOS families.

Unit-2 (P -12)

Combinational Logic Analysis and Design: Standard representation of logic functions (SO P and POS), Karnaugh map minimization. Encoder and Decoder. Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, half Adder, full Adder and subtractor.4-bit parallel adder.

Unit-3 (P -14)

Sequential logic design: Latch, Flip flop (FF), S -R FF, J -K FF, T and D type FFs, Clocked FFs, Registers, Counters (ripple, synchronous and asynchronous, ring and modulo-N), State Table, State Diagrams.

Unit-4 (P -08)

Programmable Logic Devices: Introduction to Programmable circuits, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL)

Memories: General Memory Operation, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAPROM

Essential Text:

Unit 1:

Chapter 1,2,7,10.

M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia,(Fourth Edition)

Unit 2:

Chapter 3,4.

M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia,(Fourth Edition)

Unit 3:

Chapter 5,6.

M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia,(Fourth Edition)

Unit 4:

Chapter 7.

M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia,(Fourth Edition)

Suggested books:

1. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
2. W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India(2000)
3. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

FOUR YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Digital System Design (Practical)

To implement the following in hardware and simulate the same using software.

1. To verify and design AND, OR, NOT and XOR gates using NAND gates.
2. To convert a Boolean expression into logic gate circuit and assemble it using logic gate IC,s.
3. Design a Half and Full Adder.
4. Design a Half and Full Subtractor.
5. Design a seven segment display driver.
6. Design a 4 X 1 Multiplexer using gates.
7. To build a Flip- Flop Circuits using elementary gates.(RS, Clocked RS, D-type).
8. Design a counter using D/T/JK Flip-Flop.
9. Design a shift register and study Serial and Parallel shifting of data.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

C++ and Data Structures **Total Periods: 48**

Unit-1 (P-20)

C++ Programming Language:

Introduction to Object Oriented Programming, Data Abstraction and Abstract Data Type (ADT), Data Encapsulation and hiding, Class Instantiation, Static and Dynamic Memory Allocation, Inheritance, Polymorphism and Dynamic Binding, Function Overloading, Operator Overloading, Friend Function and Friend Classes, Exception Handling, Template Functions and classes

Unit-2 (P-10)

Data Structures:

Arrays and Linked Lists: Arrays and Pointers, Arrays & Structures, Single, Double, Linear and Circular Linked Lists, Applications of Linked lists

Stacks: Implementing stacks using linked lists, Applications of stacks

Unit-3 (P-9)

Queues: Linked List Implementation of queues, Linear and Circular queues, Circular Buffers, Priority queues

Searching and sorting: Linear search, Binary search, Quick sort, merge sort

Unit-4 (P-9)

Trees: Concept of a tree, Binary tree and its implementation in C++, Classification of binary trees, Applications of binary trees: - Heap trees, Binary Search Trees (BSTs), Traversals and Search operation in BST, Divide and Conquer strategy to implement a BST, Degenerated BST, Height Balancing in trees.

Essential Text:

UNIT I:

1. Chapter 11-24, The Complete Reference C++ by Herbert Schildt (TMH Third Edition),

2008 UNIT II:

1. Chapter 2, 4 - 5, Data Structures Using C and C++ by Y Langsam, M J Avgenstein, A M Tenenbaum (PHI), 2008.

UNIT III:

1. Chapter 6, Data Structures Using C and C++ by Y Langsam, M J Avgenstein, A M Tenenbaum (PHI), 2008.

UNIT IV:

1. Chapter 7, Data Structures Using C and C++ by Y Langsam, M J Avgenstein, A M Tenenbaum (PHI), 2008.

Suggested Books:

1. Programming Principles & Practice Using C++ by Bjarne Stroustrup, Addison Wesly
2. Data Structures, Algorithms and Applications in C++ by Sartaj Sahni (McGraw-Hill)
3. Schaum's Series in Data structures- Lipshutz, TMH

Practical: Programs ofC++ (Any eight)

1. W. A. P to maintain an account of a customer using classes.
2. W. A. P to simulate the results of a class using class student.

3. W. A. P to maintain a small library of 100 books using class Library.
4. W. A. P to add, subtract, multiply and divide two matrices using operator overloading.
5. W. A. P to implement friend functions and friend classes.
6. W. A. P to implement default, parameterized and copy constructors in the same program.
7. W. A. P to implement multilevel inheritance.
8. W. A. P to implement hierarchical inheritance.
9. W. A. P to implement single level, multilevel, hierarchical and multiple inheritances.
10. W. A. P to implement compile time and run time polymorphism.
11. W. A. P to implement exception handling.
12. W. A. P to implement function templates and class templates.

Programs of Data
Structures (Any five)

1. W. A. P to implement linear and circular linked lists using single and double pointers.
2. W. A. P to implement stacks using arrays and linked lists.
3. W. A. P to implement circular queues using arrays and linked lists.
4. W. A. P to implement polynomial addition and subtraction using linked lists.
5. W. A. P to implement sparse matrices using arrays and linked lists.
6. W. A. P to binary tree using linked lists and perform in order, preorder and post order traversals.
7. W. A. P to implement binary search tree using linked lists. Compare its time complexity over that of linear search.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-IV

Analog Electronics-II

Core Paper
Total Periods: 48

Unit-1 (P-15)

Basic Operational Amplifier: Concept of differential amplifiers (Dual input balanced and unbalanced output), constant current bias, current mirror, cascaded differential amplifier stages with concept of level translator, block diagram of an operational amplifier (IC 741)

Op-Amp parameters: input offset voltage, input offset current, input bias current, differential input resistance, input capacitance, offset voltage adjustment range, input voltage range, common mode rejection ratio, slew rate, supply voltage rejection ratio.

Op-Amp in open and closed loop configuration: Frequency response of an op-amp in open loop and closed loop configurations, Inverting, Non-inverting, summing and difference amplifier, Integrator, Differentiator, voltage to current converter, current to voltage converter.

Unit-2 (P-11)

Comparators: Basic comparator, Level detector, Voltage limiters, Schmitt Trigger.

Signal generators: Phase shift oscillator, Wein bridge oscillator, Square wave generator, triangle wave generator, saw tooth wave generator, and Voltage controlled oscillator (IC 566).

Unit-3 (P-11)

Multivibrators (IC 555): Block diagram, Astable and monostable multivibrator circuit, Applications of Monostable and Astable multivibrators. Phase locked loops (PLL): Block diagram, phase detectors, IC565.

Unit- 4 (P-11)

Signal Conditioning circuits: Sample and hold systems, Active filters: First order low pass and high pass butterworth filter, Second order filters, Band pass filter, Band reject filter, All pass filter, Log and antilog amplifiers.

Essential Text:

Unit-1: Chapter- 1 to 7, R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2nd Edition, PHI(1997)
Unit-2: Chapter- 8&9 , R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2nd Edition, PHI (1997)
Unit-3: Chapter-10, R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2nd Edition, PHI (1997)
Unit-4: Chapter- 8&9, R. A. Gayakwad, Operational-Amplifiers and Linear IC's, 2nd Edition, PHI (1997); Chapter-4, Roy Choudhry and Shail Jain, Linear Integrated Circuits, New Age International Publishers Ltd (2001).

Suggested Books:

1. R. F. Coughlin and F. F. Driscoll, Operational amplifiers and Linear Integrated circuits, Pearson Education (2001)
2. J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw-Hill,(2001)
3. A.P.Malvino,Electronic Principals,6th Edition , Tata McGraw-Hill,(2003)
4. K.L.Kishore,OP-AMP and Linear ICs,Pearson(2011)

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Practical based on Analog Electronics-II

(At least five practical to be performed in hardware and software.)

1. To study op-amp characteristics: CMRR and Slew rate.
2. To design an amplifier of given gain for an inverting and non-inverting configuration using an op-amp.
3. To design an integrator using op-amp for a given specification and stud its frequency response.
4. To design a differentiator using op-amp for a given specification and stud its frequency response.
5. To design a First Order Low-pass filter using op-amp.
6. To design a First Order High-pass filter using op-amp.
7. To design a RC Phase Shift Oscillator using op-amp.
8. To study IC 555 as an astable multivibrator.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

Electronic Instrumentation **Total Periods: 48**

Unit 1 (P-12)

Quality of measurement: units: S. I. System of units, dimensions and standards; errors in measurement, types of static error, sources of error, dynamic characteristics and statistical analysis.

Dc and ac bridges: Wheatstone, Wein's bridge, Kelvin single and double bridge, Maxwell bridge, hey bridge and Schering bridge.

Unit 2 (P- 12)

Basic measurement instruments: dc measurement: dc voltmeter, ohmmeter and ammeter. Digital type voltmeter, ammeter and ohmmeter, digital multimeter, ac measurement, voltmeter, ammeter. Digital frequency counter, elements of frequency meter, universal counter and its different modes, measurement errors and extending the frequency range.

Unit 3 (P-12)

Electronic displays: the cathode ray oscilloscope (CRO): block diagram of a general purpose oscilloscope and its basic operation, electrostatic focusing and deflection, screen for CRT and graticules, CRT connections, CRO probes. Types of CRO's: dual trace oscilloscope, sampling oscilloscope

.

Unit 4 (P-12)

Signal generators: types of generators and their operation: audio oscillator, function generators, pulse generators

Transducers:: introduction to different types of transducers, temperature transducers, resistance thermometers, thermocouple, thermistor and semiconductor p-n junction transducer, light transducers: photoresistors, photovoltaic cells, photodiodes.

Essential Text:

UNIT 1

CHAPTERS 1,11- H. S. Kalsi, Electronic Instrumentation, Tata Mcgraw Hill (2006)

UNIT 2

CHAPTER 3,4, 5, 6- H. S. Kalsi, Electronic Instrumentation, Tata Mcgrawhill (2006)

UNIT 3

CHAPTER 2, 7- H. S. KALSI, Electronic Instrumentation, Tata Mcgrawhill (2006)

UNIT 4

CHAPTERS 8, 13- H. S. KALSI, Electronic Instrumentation, Tata Mcgrawhill (2006)

Suggested books:

1. Joseph j Carr, elements of electronic instrumentation and measurement, pearson education (2005)
2. C. S. Rangan, G. R. Sarma and V. S. Mani, instrumentation devices and systems, Tata Mcgraw Hill (1998)
3.. H. Cooper, modern electronic instrumentation and measurement techniques, Pearson Education (2005)
4.. R. A. Witte, electronic test instruments: analog and digital measurements, Tata Mcgraw Hill (2004)
5. S. Wolf and R. F. M. Smith, student reference manual for electronic instrumentation laboratories, Pearson Education (2004)

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Practicals Electronic Instrumentation

1. To study the variations of thermo-emf of a thermocouple with difference in temperature of its two junctions.
2. To calibrate a thermocouple to measure temperature in a specified range using null method and direct measurement using op-amp.
3. Frequency measurement using change in resistance using LDR.
4. Study of Wein bridge oscillator.
5. Study of De Sauty's bridge .
6. Study of Anderson's/Careyfosterbridge .
7. Design of multi range ammeter using galvanometer.
8. Design of multi range voltmeter using galvanometer.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core paper
Total Periods: 48

Signals & Systems

Unit-1 (P-15)

Signals and Systems: Continuous and discrete time signals, Transformation of the independent variable, Exponential and sinusoidal signals, Impulse and unit step functions, Continuous-Time and Discrete-Time Systems, Basic System Properties.

Unit-2 (P--11)

Linear Time -Invariant Systems (LTI): Discrete time LTI systems, the Convolution Sum, Continuous time LTI systems, the Convolution integral. Properties of LTI systems, Commutative, Distributive, Associative.

Unit-3 (P-11)

LTI systems with and without memory, Invariability, Causality, Stability, Unit Step response. Differential and Difference equation formulation, Block diagram representation of first order systems.

Unit-4 (P-11)

Laplace Transform: Laplace Transform, Inverse Laplace Transform, Properties of the Laplace Transform, Laplace Transform Pairs, Laplace Transform Methods in Circuit Analysis, Impulse and Step response of RL, RC and RLC circuits.

Essential Text:

Unit-1

Chapter 1 A. V. Oppenheim, A. S. Wilsky and S. H. Nawab, Signals and Systems, Pearson Education (2007) Chapter 1 S. Haykin and B. V. Veen, Signal and Systems, John Wiley & Sons (2004)

Unit-2

Chapter 2 A. V. Oppenheim, A. S. Wilsky and S. H. Nawab, Signals and Systems, Pearson Education (2007) Chapter 2 S. Haykin and B. V. Veen, Signal and Systems, John Wiley & Sons (2004)

Unit-3

Chapter 2 A. V. Oppenheim, A. S. Wilsky and S. H. Nawab, Signals and Systems, Pearson Education (2007) Chapter 2 S. Haykin and B. V. Veen, Signal and Systems, John Wiley & Sons (2004)

Unit-4

Chapter 9 A. V. Oppenheim, A. S. Wilsky and S. H. Nawab, Signals and Systems, Pearson Education (2007) Chapter 6 S. Haykin and B. V. Veen, Signal and Systems, John Wiley & Sons (2004)
Chapter 15 & 16 C. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2008)

Suggested Books:

1. H. P. Hsu, Signals and Systems, Tata McGraw Hill (2007)
2. S. T. Karris, Signal and Systems: with MATLAB Computing and Simulink Modelling, Orchard Publications (2008)
3. W. Y. Young, Signals and Systems with MATLAB, Springer (2009)
4. M. Roberts, Fundamentals of Signals and Systems,Tata McGraw Hill (2007)

FOUR YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Signals & Systems (Practicals)

Learning SciLAB/MATLAB (Experiments based on available system)
Explorations of Signals and Systems using SciLAB/MATLAB

1. Generation of Signals: continuous time
2. Generation of Signals: discrete time
3. Convolution of Signals
4. Solution of Difference equations.
5. Introduction to SIMULINK and calculation of output of systems represented by block diagrams

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-V

Core Paper

Microprocessors **Total Periods: 48**

Unit-1 (P-12)

Introduction to 8085 – Basic/applications: 8086 Microprocessor: Internal architecture, Real mode memory addressing, Instruction Format. Addressing modes: Data-Addressing modes, Program Memory-Addressing modes, Stack Memory-Addressing modes.

Unit-2 (P-12)

Instruction Set: Programming 8086 using
Data movement instructions: MOV, PUSH/POP, Load-Effective Address, String data transfers, miscellaneous data transfer instructions,
Arithmetic and logic instructions: Addition, Subtraction and comparison, Multiplication and division, BCD and ASCII arithmetic, Basic logic instructions, Shift and Rotate, String comparisons,
Program control instructions: Jump group, controlling the flow of an assembly language program, procedures, Introduction to interrupts. Machine control and miscellaneous instructions.

Unit-3 (P-12)

Peripheral Devices: 8255-Programmable Peripheral Interface, 8254- Programmable interval Timer, 8259-Priority Interrupt Controller, 8251- USART,

Unit-4 (P-12)

Interrupts: Basic interrupt processing, Interrupt instructions, Operation of real mode interrupt, interrupt flag bits, Hardware interrupts.
DMA: Introduction to Direct memory Access.
Other Microprocessors: Introduction to 80486, Pentium and Pentium Pro Microprocessors. Introduction to protected mode memory addressing.

Essential
Books: Unit1:
Chapter 1
Advanced Microprocessors & Peripherals by A K Ray & K M Bhurchandi (Third Edition) McGraw Hill
Chapter 2,3,4
Microprocessor Architecture, Programming and Applications with the 8085 (5^{th} Edition, 2002) by Ramesh S. Gaonkar, Prentice Hall
Yu- Cheng Liu, Glenn A. Gibson- Microcomputer System: The 8086/8088 Family Architecture, Programming and Design(Second Edition) Prentice Hall of India Private Limited.
Unit 2:
Chapter 5,6.
Walter A. Triebel and Avtar Singh : The 8088and 8086 Microprocessors Programming, Interfacing, software,Hardware and Applications (Fourth Edition), Pearson.
Unit 3:
Chapter 11.
Walter A. Triebel and Avtar Singh : The 8088and 8086 Microprocessors Programming, Interfacing, software,Hardware and Applications (Fourth Edition), Pearson.
Chapter 6
Advanced Microprocessors & Peripherals by A K Ray & K M Bhurchandi (Third Edition) McGrawHill

FOUR YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Unit 4:
Chapter 10.
Walter A. Triebel and Avtar Singh: The 8088and 8086 Microprocessors Programming, Interfacing, software,Hardware and Applications (Fourth Edition), Pearson (2012).
Chapter 5,6
Advanced Microprocessors & Peripherals by A K Ray & K M Bhurchandi (Third Edition) McGraw Hill (2009).
Chapter 2 (Section 2.3), 18 (Section 18.1 page734, Section 18.2,18.6)
B. Brey, The Intel Microprocessors- Architecture, Programming and Interfacing, Pearson Education (Eighth Edition).

Suggested Books:

1. D. V. Hall, Microprocessors and Interfacing- Programming and Hardware, Tata Mcgraw Hill(1999)
2. The x86 PC- Assembly Language, Design & Interfacing (5th Edn) by Mazidi, Mazidi & Causey (pearson Education)

Practical –Microprocessor

1. To write assembly language program to add two- 8bit, 16-bit and 32 bit hexadecimal numbers.
2. To write assembly language program to transfer and add a block of data.
3. To write assembly language program to multiply two 8-bit, 16- bit hexadecimal numbers.
4. To write assembly language program to convert a 16-bit hexadecimal number to Decimal number.
5. To write assembly language program to generate Fibonacci series.
6. To write assembly language program to sort hexadecimal numbers in ascending/descending order.
7. To find the square root of an integer.
8. To study working of IC 8255/8254/8259/8251 interfaced with the 8086 m

YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper
Total Periods: 48

Electromagnetic waves and Transmission Lines

Unit-1 (P-11)

Maxwell's Equations: Faraday's laws, Transformer and motional E.M.F, displacement current, Maxwell Equation in differential and integral form, constitutive relations and Boundary Conditions.

Electromagnetic Wave Propagation: the wave equation, Unifom Plane Wave, Wave Polarisation, Wave propagation in Dielectrics, Poynting's theorem, Propagation in Good Conductors, Skin Effect, Reflection of uniform Plane Waves at normal incidence, Plane Wave reflection at Oblique Incidence, Wave propagation in dispersive media, concept of phase velocity and group velocity.

Unit-2 (P-12)

Transmission Lines: Typical Transmission lines- Co-axial, Two Wire, Microstrip, Coplanar and SlotLines, Transmission Line Parameters, Transmission Line Equations, Wave propagation in Transmission lines,lowloss,lossless line, Distortionless line, InputImpedence, Standing Wave Ratio ,Power. and lossy lines, ShortedLine, Open-Circuited Line, Matched Line, Smith Chart, Transmission Line Applications.

Unit-3 (P-11)

Wave guides: Parallel plate waveguides-TM and TE modes, Rectangular wave guides -TM and TE mode, Wave propagation in guide, Power transmission and attenuation, Rectangular cavity resonators, directional couplers, isolator, circulator.

Unit-4 (P-11)

Radiation of electromagnetic waves and retarded potentials, Antenna patterns and antenna parameters, Types of antennas- Hertzian dipole, half wave dipole, quarter-wave dipole, Yagi-Uda, microstrip, parabolic antenna, helical antenna, Antenna array.

<u>Essential Texts</u>

UNIT 1
CHAPTERS 3, 4, 5, 6, 7- M. N. O. Sadiku, Principles of Electromagnetics, Oxford University Press (2001)
UNIT 2
CHAPTER 8,9-M. N. O. Sadiku,Principles of Electromagnetics, Oxford University Press (2001)
UNIT 3
CHAPTER 10-M. N. O. Sadiku,Principles of Electromagnetics, Oxford University Press (2001)
UNIT 4
CHAPTERS 11,12-M. N. O. Sadiku,Principles of Electromagnetics, Oxford University Press (2001)

Suggested Books:

1. Karl E. Longren,Sava V. Savov, Randy J. Jost., Fundamentals of Electromagnetics with MATLAB,PHI (For MATLAB experiments)
2. W. H. Hayt and J.A. Buck, Engineering Electromagnetics, Tata McGraw Hill (2006)
3. D. C. Cheng, Field and Wave Electromagnetics, Pearson Education (2001)
4. J. A. Edminster, Electrmagnetics, SchaumSeries, Tata McGraw Hill (2006)
5. N. Narayanrao, Elements of Engineering Electromagnetics, Pearson Education (2006)
6. G. S. N. Raju, Antennas and Propagation, Pearson Education (2001)

PRACTICALS- Electromagnetic waves and transmission Lines
Experiments using MATLAB, PSICE and other freeware/ simulation softwares

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

Communication Electronics **Total Periods: 48**

Unit-1 (P-08)

Introduction: Block diagram of an electronic communication system, electromagnetic spectrum-band designations and applications, need for modulation, concept of channels and base-band signals.

Concept of Noise: Types of Noise, signal to noise ratio, noise figure, noise temperature, Friss formula.

Unit-2 (P-15)

Amplitude Modulation, modulation index and frequency spectrum.Generation of AM, Amplitude Demodulation (diode detector), Concept of Double side band suppressed carrier, Single side band suppressed carrier, other forms of AM (Pilot Carrier Modulation, Vestigial Side Band modulation, Independent Side Band Modulation)

Angle modulation: Frequency and Phase modulation, modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM (direct and indirect methods), FM detector (PLL). Comparison between AM, FM and PM.

Unit-3 (P-12)

Pulse Analogn Modulation: Sampling theorem, PAM, PDM, PPM modulation and detection techniques, Time Division Multiplexing.

Pulse Code Modulation: Need for digital transmission, Quantizing, Uniform and Non-uniform Quantization, Quantization Noise, Companding, Coding, Decoding, Regeneration.

Unit-4 (P-13)

Digital Carrier Modulation Techniques: Block diagram of digital transmission and reception, Information capacity, Bit Rate, Baud Rate and M-ary coding. Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK) and Quadrature Phase Shift Keying (QPSK)

Essential Texts:

Unit-1 Chapter 1 and 2, Electronic communication systems- Kennedy, 3rd edition, McGraw international Publications

Unit-2

1. Chapter3,4,and 5,Electronic communication systems- Kennedy, 3rd edition, McGraw international publications
2. Chapter 3, 4. 5 and 6.,Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill

Unit-3

1. Chapter 7, Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill.
2. Chapter 7,8, Communication Systems, S. Haykin, Wiley India (2006)

Unit-4

1. Chapter 2, Advanced electronic communications systems – Tomasi, 6th edition, PHI.
2. Chapter 9,10, Communication Systems, S. Haykin, Wiley India (2006)

.

Suggested Books:

1. W. Tomasi, Electronic Communication Systems: Fundamentals through Advanced, Pearson Education (2007)
2. H. Taub and D. Schilling, Principles of Communication Systems, Tata McGraw Hill (1999)
3. R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill (2007)
4. Roddy and Coolen, Electronic Communications PHI
5. L. W. Couch II, Digital and Analog Communication Systems, Pearson Education (2005)

PRACTICALS- Communication Electronics

(Any five practical to be done)

1. Study of Amplitude Modulation
2. Study of Amplitude Demodulation
3. Study of Frequency Modulation
4. Study of Frequency Demodulation
5. Study of Pulse Amplitude Modulation
6. Study of Pulse Width Modulation
7. Study of Pulse Position Modulation
8. Study of Pulse Code Modulation
9. Study of Amplitude Shift Keying
10. Study of Phase Shift Keying,
11. Study of Frequency Shift Keying.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-VI

Core Paper

Embedded Systems **Total Periods: 48**

Unit – I

Overview of Embedded Systems, Features, Requirements and Applications, Recent Trends in the Embedded System Design, Common architectures for the Embedded System Design, Embedded Software design issues. Introduction to microcontrollers, Overview of Harvard architecture and Von Neumann architecture, RISC and CISC microcontrollers

Unit – II

Introduction to AVR RISC Microcontrollers, Architecture overview, status register, general purpose register file, memories, Instruction set, Data Transfer Instructions, Arithmetic and Logic Instructions, Branch Instructions, Bit and Bit-test Instructions, MCU Control Instructions. Simple programs in Assembly Language / C Language

Unit – III

Introduction to System Clock, Reset sources, Introduction to interrupts, External interrupts, IO Ports, 8-bit and 16-bit Timers, introduction to different modes, Input Capture and Compare Match.

Unit – IV

Analog Comparator, Analog-to-Digital Converter, Serial Peripheral Interface (SPI), The Universal Synchronous and Asynchronous serial Receiver and Transmitter (USART), Two Wire Interface (TWI) / I^2C bus

Essential Texts:

1. AVR Microcontroller and Embedded Systems: Using Assembly and C by Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi, PHI
2. Programming and Customizing the AVR Microcontroller by D V Gadre, McGraw-Hill
3. Atmel AVR Microcontroller Primer: Programming and Interfacing by Steven F. Barrett, Daniel J. Pack, Morgan & Claypool Publishers
4. An Embedded Software Primer by David E Simon, Addison Wesley
5. AVR Microcontroller Datasheet, Atmel Corporation, www.atmel.com

Practical Experiments on AVR Microcontroller

1. To calculate simple mathematical expressions such as N!, 2^N, M^N, etc.
2. To generate first N terms of infinite series such as Fibonacci series, A.P. series, G.P. series, etc.
3. To sort data in an array.
4. To interface a simple keyboard and LED with microcontroller. To display key status on LED using various algorithms such as (i) LED should be ON till the corresponding key is pressed. (ii) LED should be ON when the corresponding key is pressed once. Led should be switched OFF when the key is pressed next.
5. To display different patterns on LEDs using Timers.

6. To interface an LCD with microcontroller. Write an initialization subroutine and display a custom message on it.
7. To measure analog voltage using ADC and display its value on LCD.
8. To measure the frequency of an AC signal.
9. To control speed of an DC motor.
10. To control speed of a Stepper motor

UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

Control Systems **Total Periods: 48**

UNIT1

Introduction of open loop and closed loop control systems, mathematical modeling of physical systems (Electrical, Mechanical and Thermal), derivation of transfer function, Armature controlled and field controlled DC servomotors, AC servomotors, block diagram representation & signal flow graph, Reduction Technique, Mason's Gain Formula. Effect of feedback on control systems, Basic Control Actions: Proportional, integral and Derivative controls

12 Periods

UNIT 2

Time – Domain Analysis:-Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants, performance indices, response with P, PI and PID Controllers. **Concept of Stability:** Asymptotic stability and conditional stability, Routh – Hurwitz criterion, relative stability analysis, Root Locus plots and their applications.
12 Periods

UNIT3

Frequency Domain Analysis: Correlation between time and frequency response, Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots), gain and phase margins, Nyquist stability criterion, relative stability using nyquist criterion, constant M & N circles.
14 Periods

UNIT4

Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks **State Space Analysis:** Definitions of state, state variables, state space, representation of systems, Solution of time invariant, homogeneous state equation, state transition matrix and its properties
10 Periods

Essential Books:

UNIT 1

Chapter 1,2,3,4- I. J. Nagrath & M. Gopal, Control System Engineering, New Age International, 2000

Chapter 1,3- K. Ogata, Modern Control Engineering, PHI 2002

Chapter 1,3,4- B. C. Kuo , "Automatic control system", Prentice Hall of India, 2000

UNIT 2

Chapter 5,6,7 - I. J. Nagrath& M. Gopal, Control System Engineering, New Age International, 2000

Chapter 5,6,7 - K. Ogata, Modern Control Engineering, PHI 2002

Chapter 6,7,8,10 - B. C. Kuo , "Automatic control system", Prentice Hall of India, 2000

UNIT 3

Chapter 8,9 - I. J. Nagrath& M. Gopal, Control System Engineering, New Age International, 2000

Chapter 8 - K. Ogata, Modern Control Engineering, PHI 2002
Chapter 9 - B. C. Kuo , “Automatic control system”, Prentice Hall of India, 2000
UNIT 4
Chapter 10,12 - I. J. Nagrath& M. Gopal, Control System Engineering, New Age International, 2000
Chapter 9,11 - K. Ogata, Modern Control Engineering, PHI 2002 2
Chapter 5,10 - B. C. Kuo , “Automatic control system”, Prentice Hall of India, 2000

Suggested Books:

1. Dr. N.K Jain, Automatic Control System Engineering, Dhanpat Rai Publication,2005
2. B. S. Manke, Linear Control Systems, Khanna Publishers, Delhi

Control Systems (Practical based on Paper No 11)

(Any eight)

1. To study characterstics of :
   a. Synchro transmitter receiver
   b. Synchro as an error detector
2. To study position control of DC motor
3. To study speed control of DC motor
4. To find characteristics of AC servo motor
5. To study time response of type 0,1 and 2 systems
6. To study frequency response of first and second order systems
7. To study time response characteristics of a second order system.
8. To study effect of damping factor on performance of second order system
9. To study frequency response of Lead and Lag networks.
10. Study of P, PI and PID controller.

Some of the experiments mentioned above can be simulated on software (Matlab,MathCAD,LabVIEW)

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper
Total Periods: 48

Engineering Mathematics -II

Unit-1 (P-10)

Ordinary Differential Equations: First Order Ordinary Differential Equations, Basic Concepts, Modelling Separable Ordinary Differential Equations, Modelling, Exact Ordinary Differential Equations, Linear Ordinary Differential Equations .

Unit-2 (P-13)

Linear Differential Equations of Second Order :Homogeneous Linear Ordinary Differential Equations of second order, :Homogeneous Linear Ordinary Differential Equations with constant coefficients, Modelling: Free Oscillations, Euler-cauchy Equations, Existence and Uniqueness of solutions, Non-Homogeneous ODEs, Modeling: Forced Oscillations. Higher order homogeneous differential equations.

Unit-3 (P-12)

Series Solutions of Differential Equations and Special Functions: Power Series Method, Legendre Polynomials, Frobenius Method, Bessel's equations and Bessel's functions of first and second kind. Error functions and gamma function.

Unit-4 (P-13)

Fourier series :Functions of any period, even and odd Functions, half range expansions, Forced Oscillations, Complex Fourier Series Fourier Integral, Fourier Sine and Cosine Transforms. , Fourier Transforms ,Discrete and Fast Fourier Transforms.

Partial Differential Equations: Formation of Partial Differential Equation, Partial Differential Equation of First Order, Linear Equations of First Order, Non-linear Partial Differential Equations of First Order, Method of Separation of Variables, Classification of Partial Differential Equations of Second Order. Modeling a Vibrating string and the Wave Equation, Separation of Variables and Use of Fourier series.

Essential Texts

UNIT1

Chapter 1- E. Kreyszig, Advanced Engineering Mathematics, Wiley India (2008)

UNIT 2

Chapter 2,3- E. Kreyszig, Advanced Engineering Mathematics, Wiley India (2008)

UNIT 3

Chapters 4- E. Kreyszig, Advanced Engineering Mathematics, Wiley India (2008)

UNIT 4

Chapters 11,12- E. Kreyszig, Advanced Engineering Mathematics, Wiley India (2008)

Suggested Books:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Graw Hill Publishing Company Limited (2007)
2. R. K. Jain, and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House (2007)
3. C. R. Wylie and L. C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill (2004)

FOUR YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Practicals Engineering Mathematics –2 (C/Matlab Based Practicals)

1. Solve the linear differential equation of second order with variable coefficients.
2. Solve the linear differential equation of second order with constant coefficients.
3. Solve the higher order linear homogeneous differential equation.
4. Solve the higher order non- linear homogeneous differential equation.
5. Solve the linear partial differential equation of first order.
6. Solve the non-linear partial differential equation of first order.
7. Solve two dimensional wave equations.
8. Solve two dimensional heat equations.
9. Solve Bessel's function of first order.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Allied Engineering Paper
Total Periods: 48

Digital Signal Processing

Unit 1 (P5)

Discrete Time systems: Discrete sequences, linear coefficient difference equation, Representation of DTS, LSI Systems. Stability and causality, frequency domain representations and Fourier transform of DT sequences.

Unit 2 (P8)

Z-Transform: Definition and properties, Inverse Z Transform and stability. Parsevals Theorem and applications.

System Function: signal flow graph, its use in representation and analysis of Discrete Time Systems. Techniques of representations. Matrix generation and solution for DTS evaluations.

Unit 3 (P10)

Discrete Fourier Transform: DFT assumptions and Inverse DFT. Matrix relations, relationship with FT and its inverse, circular convolution, DFT theorems, DCT. Computation of DFT. FFT Algorithms and processing gain, Discrimination ,interpolation and extrapolation. Gibbs phenomena. FFT of real functions interleaving and resolution improvement. Word length effects.

Unit 4 (P8)

Digital Filters: Analog filter review. System function for IIR and FIR filters, network representation. Canonical and decomposition networks. IIR filter realization methods and their limitations. FIR filter realization techniques. Discrete correlation and convolution; Properties and limitations.

Essential Texts

1. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.

2. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Applications, Prentice Hall, 1997.

Practicals Digital Signal Processing (Matlab Based Practicals)

1. Generation in MATLAB of unit sample sequence, unit step, ramp function, discrete time sequence, real sinusoidal sequence.
2. Generate and plot sequences over an interval.
3. Given x[n], write program in MATLAB to find X[z].
4. Fourier Transform, Discrete Fourier Transform and Fast Fourier Transform
5. Design of a Butterworth analog filter for low pass and high pass.
6. Design of digital filters.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-VII

Core Paper

Power Electronics **Total Periods: 48**

Unit 1 P 10

Power diodes, Enhancement of reverse blocking capacity, reverse recovery silicon controlled rectifier (SCR) structure, I-V characteristics, turn ON an turn OFF characteristics, ratings, control circuits design and protection circuits. Gate turn-off thyristor (GTO), I-V characteristics, turn ON, turn OFF characteristics, limitation of power handling capability, GTO snubber consideration, power MOSFETs, operation modes, switching characteristics, power BJT, second breakdown, saturation and quasi saturation state.

Unit 2 P 10

Basic structure, working and V-I characteristic of Diac and Triac, application of a diac as a triggering device for a triac. Insulated Gate Bipolar Transistors (IGBT) Basic structure, I-V Characteristics, switching characteristics, device limitations and safe operating area (SOA) etc.

Application of SCR: SCR as a static as switch phase controlled rectification, half wave full wave and bridge rectifiers with inductive non-inductive loads; Analysis for a single phase supply, idea of three phase supply AC voltage control using SCR and Triac as a switch.

Unit 3 P 12

Power Inverters and DC Choppers: Need for commutating circuits and their various types, d.c. link invertors parallel capacitors commutated invertors with and without reactive feedback and its analysis, Series Invertors and its improved version, bridge invertors.

Unit 4 P 8

Choppers: Use of an SCR as a d.c. switch, the parallel capacitor commutated d.c. switch triggering circuits for d.c. switches, operation of d.c. chopper circuits using B-type commutating circuit, (ii) cathode pulse turn-off of SCR, Morgan's chopper.

Essential Texts

1 "Power Electronics Circuits, Devices and Aplications", 3rd Edtn., by M.H. Rashid, PEARSON EDUCATION

2 "Power Elecronics, Conver, Applications and Design by Ned Mohan, Tore.

Practicals –Power Electronics

1. To study the I-V characteristics of DIAC
2. To study the I-V characteristics of a TRIAC
3. To study the I-V characteristics of a SCR

4. SCR as a half wave and full wave rectifiers.
5. DC motor control using SCR.
6. DC motor control using TRIAC.
7. To use UJT as a trigger for TRIAC.
8. To study parallel and bridge inverter.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

Photonics **Total Periods: 48**

Unit-1 (P-13)

Light as an Electromagnetic Wave: Plane waves in homogeneous media, concept of spherical waves,. Reflection and transmission at an interface, total internal reflection, Brewster's Law. Interaction of electromagnetic waves with dielectrics: origin of refractive index, dispersion.

Interference : Superposition of waves of same frequency, Concept of coherence, Interference by division of wavefront, Young's double slit, Division of Amplitude, thin film interference, anti-reflecting films, Newton's rings; Michelson interferometer

Diffraction: Huygen Fresnel Principle, Diffraction Integral, Fresnel and Fraunhoffer approximations. Fraunhoffer Diffraction by a single slit, rectangular aperture ,double slit, circular aperture; Resolving power of microscopes and telescopes; Diffraction grating

Unit-2 (P-11)

Polarization: Linear, circular and elliptical polarization, polarizer-analyzer and Malus' law; Double refraction by crystals, Interference of polarized light, Principle of Liquid Crystal Displays.

Wave propagation in crystals: Wave propagation in uniaxial media. Half wave and quarter wave plates. Faraday rotation and electrooptic effect.

Unit-3 (P-12)

LEDs : Light Emitting Diodes: principle, structure and material s. Lasers: Interaction of radiation and matter, Einstein coefficients, Condition for amplification, laser cavity, threshold for laser oscillation, line shape function. Examples of common lasers. The semiconductor injection laser diode. Holography. Photodetectors: Bolometer, Photomultiplier tubes, Charge Coupled Devices; Photodiodes (p-i-n, avalanche), quantum efficiency and responsively.

Unit-4 (P-12)

Dielectric waveguide and Fiber: TE and TM modes in symmetric stub waveguides, effective index, field distributions , Dispersion relation , and group velocities. Step index optical fiber, total internal reflection ,concept of linearly polarized waves in the step index circular dielectric waveguides, single mode and multimode fibers, attenuation and dispersion in optical fiber.

Essential Texts

UNIT 1

CHAPTERS 12, 13, 16, 17-AjoyGhatak, Optics, Tata McGraw Hill, New Delhi (2005) UNIT 2

CHAPTER 19-AjoyGhatak, Optics, Tata McGraw Hill, New Delhi (2005)

UNIT 3

CHAPTER 4, 5, 7 Wilson and Hawkes ,Optoelectronics; An Introduction(3^{rd} ed.) PHI. UNIT 4

CHAPTERS 8-Wilson and Hawkes ,Optoelectronics; An Introduction(3^{rd} ed.) PHI.

Suggested Books:

1. Wilson and Hawkes ,Optoelectronics; An Introduction(3^{rd} ed.) PHI.
2. E. Hecht , Optics, Pearson Education Ltd. (2002)
3. S. O. Kasap, Optoelectronics and Photonics: Principles and Practices, Pearson Education (2009)
4. Ghatak A.K. and Thyagarajan K., "Introduction to fiber optics," Cambridge Univ. Press. (1998)

Practicals - Photonics

1. To verify the law of Malus for plane polarized light.
2. To determine wavelength of sodium light using Michelson's Interferometer.
3. To determine wavelength of sodium light using Newton's Rings.
4. To determine the resolving power and Dispersive power of Diffraction Grating.
5. Diffraction experiments using a laser.
6. To determine the specific rotation of scan sugar using polarimeter.
7. Characteristics of LEDs and Photo- detector.
8. To measure the numerical aperture of an optical fiber.
9. Optical Fiber as a sensor.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Allied Engineering Paper

Computer Networks **Total Periods: 48**

Unit– I

Introduction to data communication and Networks, LAN, WAN, MAN, Bluetooth, WLAN, Internet, Protocols and standards.ISO-OSI Reference Model layers and functions, TCP/IP Reference Model layers and functions. Comparison of OSI and TCP/IP reference model. (Lectures 10)

Unit II

Unshielded twisted pair(UTP), Coaxial cable, Shielded Twisted pair(STP), Optical fibre, Radio and Satellite links.(Lectures 4)

Unit III

Definition of packets and frames, transmission errors, Error Detection and Correction, Framing, Flow and error control. TCP/IP, Address resolution techniques and protocols, IP datagrams, Routing table entries, Services of TCP, End to end service and datagram, Packet loss and retransmission.IPv4, IPv6(Lectures 11)

Unit IV

Random access CSMA/CD, CSMA/CA, Controlled access, Channelization, Twisted pair Ethernet, 10 Base-T, 100 Base-T Ethernet, Network devices-repeaters, hubs, switches and bridges. Network protocols HTTP, FTP, DNS. (Lectures 11)

Essential Texts:

1. A. S. Tananbaum, "Computer Networks", 3rd Ed, PHI, 1999
2. B.A Forouzan, "Data Communication and networking", 4th edition, TMH, 2007

Practicals - Comuter Networks.

1. Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
   Apparatus (Components): RJ-45 connector, Climping Tool, Twisted pair Cable
2. Study of following Network Devices in Detail :Repeater Hub Switch Bridge Router Gate Way
   Apparatus: No software or hardware needed
3. Study of network IP Classification of IP address Sub netting Super netting
4. File Transfer using TCP and UDP.
5. Connect the computers in Local Area Network.
6. Aim: Study of basic network command and Network configuration commands.
   Apparatus (Software): Command Prompt And Packet Tracer.
7. SIMULATION OF SLIDING WINDOW PROTOCOL
   AIM: To write a C program to perform sliding window.
8. DOMAIN NAME SYSTEM
   AIM: To write a C program to develop a DNS client server to resolve the given Hostname

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Project

This will be based on the research/project work carried in the previous semester. This will include the experimental/ theoretical work carried out by the student/group of the students (4-5 as the case may be).The dissertation will be evaluated as per procedure**.**

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Semester-VIII

Core Paper

Semiconductor fabrication & Characterisation **Total Periods: 48**

Unit-1 (P-15)

Introduction of Semiconductor Process Technology, Semiconductor materials, single crystal, polycrystalline and amorphous ,Crystal growth techniques: Si from the Czochralski technique, starting material, Distribution of dopants , Effective Segregation Coefficient. Silicon Float Zone Process, GaAs from Brigdman techniques. Wafer preparation .

Epitaxy Deposition: Epitaxial growth by vapor phase epitaxy (VPE) and molecular beam epitaxy (MBE).

Characterization; Various characterization methods for structural, electrical and optical properties. Basic idea of X-ray diffractometer, Scanning electron microscope ,Transmission electron microscope and UV-VIS-NIR spectrophotometer.

Unit-2 (P-12)

Oxidation : Thermal Oxidation Process: Kinetics of Growth for thick and thin Oxide , Dry and Wet oxidation. Effects of high pressure and impurities, Impurity Redistribution during Oxidation, Masking property of Silicon Oxide, Oxide Quality. Chemical vapour deposition of silicon oxide, properties of silicon oxide, step coverage, P-glass flow.

Diffusion: Basic Diffusion Process: Diffusion Equation, Diffusion Profiles. Extrinsic Diffusion: Concentration Dependent Diffusitivity. Lateral Diffusion.; Doping through Ion Implantation and its comparisation with diffusion.

Unit-3 (P-12)

Lithographic Processes: Clean room, Optical lithography, exposure tools, masks, Photoresist, Pattern Transfer, Resolution Enhancement Technique. Electron Beam Lithography, X-ray Lithography and Ion Beam Lithography. Comparison between various lithographic techniques.

Etching: Wet Chemical Etching-basic process and few examples of etchants for semiconductors, insulators and conductors; Dry etching using plasma etching technique.;

Metallization: Uses of Physical Vapor Deposition and Chemical Vapor Deposition technique for Aluminum and Copper Metallization.

Unit-4 (P-09)

Process Integration: Passive components- Integrated Circuit Resistor, Integrated Circuit Inductor, Integrated Circuit Capacitor. Bipolar Technology: Basic fabrication process, Isolation techniques. MOSFET Technology: Basic fabrication process of NMOS, PMOS and CMOS technology.

Essential Text:

Unit-1: Chapter-1&2, Gary S.May and S,M.Sze , Fundamentals of Semiconductor Fabrication, John Wiley& Sons(2004) ; Chapter-5, Ludmila Eckertova, Physics of Thin films,2nd Edition, Plenum Press(1986).

Unit-2: Chapter-3&6, Gary S.May and S,M.Sze , Fundamentals of Semiconductor Fabrication, John Wiley& Sons(2004)

Unit-3: Chapter-4,5,8, Gary S.May and S,M.Sze , Fundamentals of Semiconductor Fabrication, John Wiley& Sons(2004)

Unit-4: Chapter-9, Gary S.May and S,M.Sze , Fundamentals of Semiconductor Fabrication, John Wiley& Sons(2004)

Suggested Books:

1. S. M. Sze, Semiconductor Devices: Physics and Technology, John Wiley& Sons(2002)
2. S. K.Gandhi ,VLSI Fabrication Principles,2nd edition, John Wiley& Sons(2010)
3. S. M. Sze, VLSI Technology, 2nd edition , Tata McGraw-Hill(2004)

Practical based on Semiconductor fabrication and Characterisation

1. To measure the resistivity of semiconductor crystal with temperature by four –probe method.
2. To determine the type (n or p) and mobility of semiconductor material using Hall-effect.
3. Oxidation process Simulation
4. Diffusion Process Simulation
5. To design a pattern using photolithographic process and its simulation
6. Process integration simulation

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Core Paper

Modern Communication Systems **Total Periods: 48**

Unit-1 (P-15)

Advanced Digital Modulation Technique: DPCM, DM, ADM.
Binary Line Coding Technique, Multi level coding, QAM (Modulation and Demodulation) Multiple Access Techniques: Concept, FDMA, TDMA, CDMA.

Unit-2 (P-11)

Optical Communication: Introduction of Optical Fiber, Types of Fiber, Guidance in Optical Fiber, Attenuation and Dispersion in Fiber, Optical Sources and Detectors, Block Diagram of optical communication system, optical power budgeting

Unit-3 (P-11)

Mobile communication: Introduction to Wireless Communication Systems, Second Generation(2G0 and Third Generation(3G) network standards, Concept of Frequency Reuse, Cellular Modulation Techniques for Mobile Radio, Multiple Access Techniques for Wireless Communications, ALOHA Protocols, IEEE standard for wireless Systems, GSM & CDMA System.

Unit-4 (P-11)

Satellite Communication: Ground wave propagation, sky wave propagation-the ionosphere, space waves, tropospheric scatter propagation, extraterrestrial communications, Orbital motion, geostationary orbits, low earth orbiting satellites, Satellite Frequency(S,C,KU,KA), Satellite communication Systems-Block Diagram and its application.

Essential Text:

Unit-1

Chapter 15&19 W. Tomasi, Electronic Communication Systems: Fundamentals through Advanced, Pearson Education, 3rd Edition

Chapter 7(7.7) & 8 (8.7) Martin S. Roden, Analog & Digital Communication Systems, Prentice Hall, Englewood Cliffs, 3rd Edition

Unit-2

Chapter 7 Thiagarajan Vishwanathan, Telecommunication Switching Systems and Networks, Prentice Hall of India.

Unit-3

Chapter 1-3 Theodore S. Rappaport, Wireless Communications Principles and Practice, 2nd Edition, Pearson Education Asia.

Unit-4

Chapter 18 W. Tomasi, Electronic Communication Systems: Fundamentals through Advanced, Pearson Education, 3rd Edition

Suggested Books :

1. Dennis Roddy, Satellite Communications,4th Edition, Tata McGraw-Hill.
2. G. Kennedy and B. Davis, Electronic Communication Systems, Tata McGraw Hill
3. L. E. Frenzel, Communication Electronics, Principles and Applications, Tata McGraw Hill
4. L. W. Couch, II, Digital and Analog Communication Systems, Pearson Education

5. S. Haykin, communication systems, 2nd edition, Wiley Eastern.

Practicals: (Any five to be done)- Modern Communication Systems

1. Modulation of LED and detection through Photo detector.
2. Calculation of the transmission losses in an optical communication system.
3. Study of 16 QAM modulation and Detection with generation of Constellation Diagram
4. Study of DPCM and demodulation.
5. Study of DM, ADM
6. Study of architecture of Mobile phone.

Allied Engineering Paper
Total Periods: 48

Electrical Technology

Unit-1 (P-12)

DC Machines Basics: Basic constructional features and physical principles involved in electrical machines, armature winding (ac and dc), lap and wave connections , Coil Span, Commutation Pitch, Resultant Pitch, commutator, equalizer rings.

D.C. Generators: Construction and principles of operation, , Brief ideas about armature reaction and commutation , E.M.F. Equation, Methods of excitation, Characteristics of Self excited and Separately (Shunt, Compound and Series) excited generators (1), Losses and efficiency, applications.

D.C. Motors: Comparison of generator and motor action, Significance of back EMF, Maximum power, Torque and speed relation, Characteristics of series, shunt and Compound excited, necessity of motor starters, Three point starter, Speed control using SCR.

Unit-2 (P-12)

Transformers: Types of transformers, Transformer Construction, E.m.f. equation, No load operation, Operation under load, Phasor diagram, Transformer Losses, Voltage regulation, condition for maximum efficiency, All day efficiency, Short circuit and open circuit tests, Auto transformers.

Polyphase Circuits: Polyphase circuits, three phase transformers, delta-delta and delta –Y connection, Rectifier using SCR, Chopper, Inverter.

Unit-3 (P-12)

Poly Phase Induction Motors: General constructional features, Types of rotors, Rotating magnetic field (Ferrari's Principle), Production of torque, Slip, Torque equation, Torque-slip characteristics, Speed control of Induction motor.

Unit-4 (P-12)

Synchronous Machines: Brief construction details of three phase synchronous generators, E.M.F. equation, Principle of operation of synchronous motor.

Single Phase Induction Motors: Construction, principle of operation based on starting methods, Split phase Motors - capacitor motors, Equivalent circuit, Reluctance Motor, Stepper Motor, Single phase a.c. series motors, Universal motor.

<u>Essential Texts</u>

UNIT1

Chapters 1, 4, 5, 6, 7 , 12- I. J. Nagrath and D. P. Kothari, Electrical Machines, Tata McGraw Hill (1997), 4th ed.

Chapters 25, 26, 27, 28, 29, 30- B. L. Thareja and A. K. Thareja, Electrical Technology, S. Chand & Sons., 23rd Edition.

UNIT 2

Chapters 3- I. J. Nagrath and D. P. Kothari, Electrical Machines, Tata McGraw Hill (1997), 4th ed. Chapters 19, 2- B. L. Thareja and A. K. Thareja, Electrical Technology, S. Chand & Sons., 23rd Edition. UNIT 3

Chapters 5, 9 - I. J. Nagrath and D. P. Kothari, Electrical Machines, Tata McGraw Hill (1997),4th ed. Chapter 3 4 - B. L. Thareja and A. K. Thareja, Electrical Technology, S. Chand & Sons, 23rd Edition.

UNIT 4

Chapters 8, 10, 12- I. J. Nagrath and D. P. Kothari, Electrical Machines, Tata McGraw Hill (1997),4th ed. 43

Chapters 36,37,38,39- B. L. Thareja and A. K. Thareja, Electrical Technology, S. Chand & Sons., 23rd Edition.

Suggested Books:

1. G. Mc. Pherson, An introduction to Electrical Machines & Transformers, John Wiley & Sons (1990)
2. H. Cotton, Advanced Electrical Technology, CBS Publishers and Distributors, New Delhi (1984)
3. S. Ghose, Electrical Machines, Pearson Education (2005)
4. N. K. De and P. K. De, Electric Drives, Prentice Hall of India (1999)

Practicals –Electrical Technology

9. To study the characteristics of DC Series motor .
10. To study the characteristics of DC Shunt motor.
11. To study characteristics of single phase induction motor.
12. To study control of DC motor by SCR.
13. To Study Stepper Motor.
14. To Study Open Circuit Test on single phase transformer.
15. To Study Short Circuit Test on single phase transformer.

4 YEAR UNDERGRADUATE PROGRAMME IN ELECTRONICS

Project and Dissertation

This will be based on the research/project work carried in the previous semester. This will include the experimental/ theoretical work carried out by the student/group of the students (4-5 as the case may be).The dissertation will be evaluated as per procedure**.**