J. S. UNIVERSITY, SHIKOHABAD

B.TECH

2nd , 3rd & 4th Year

(Electronics& Comm. Engineering)

SCHEME

&

SYLLABUS

[Effective from the session 2015-16]

STUDY AND EVALUATION SCHEME FOR

B.Tech (Electronics & Communication Engineering).

SEMESTER - THIRD

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTAS-31	Engg Mathematics-III	4	1	-	-	50	100	150	3
2	BTEC-31	Network Analysis & Synthesis	4	1	-	-	50	100	150	3
3	BTEC-32	Fundamental of Electronic Devices	4	1	-	-	50	100	150	3
4	BTEC-33	Signals and Systems	4	1	-	-	50	100	150	3
5	BTEC-34	Switching Theory & Logic Design	4	1	-	-	25	50	75	2
6	BTIP-31	Industrial Psychology	4	1	-	-	25	50	75	2
7	BTAC-31	Human Value & Professional Ethics*	2	-	-	-	25	50	75	2
PRACTICA/DRAWING SUBJECTS										
8	BTEC-31P	Network Analysis & Synthesis Lab.	-	-	2	-	20	30	50	2
9	BTEC-35P	Electronics Workshop & PCB Design	-	-	2	-	20	30	50	2
10	BTEC-34P	Logic Design Lab.	-	-	2	-	20	30	50	2
11	BTEC-32P	Electronic Device Lab	-	-	2	-	20	30	50	2
12	BTGD-30	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

*Human values & Professional Ethics will be offered as a compulsory audit course for which passing marksare 30% in End Semester Examination and 40% in aggregate.

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

STUDY AND EVALUATION SCHEME FOR

B.Tech (Electronics & Communication Engineering).

SEMESTER - FOURTH

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTOE-41-BTOE-49	Science Based Open Elective	4	1	-	-	50	100	150	3
2	BTCS-45	Data Structure	4	1	-	-	50	100	150	3
3	BTEC-41	Electronic Circuits	4	1	-	-	50	100	150	3
4	BTEC-42	Electronic Measurements & Instrumentation	4	1	-	-	50	100	150	3
5	BTEC-43	Electromagnetic Field Theory	4	1	-	-	25	50	75	2
6	BTIS-41	Industrial Sociology	4	1	-	-	25	50	75	2
7	BTAC-41	Cyber Security*	2	-	-	-	25	50	75	2
PRACTICA/DRAWING SUBJECTS										
8	BTCS-45P	Data Structure Lab.	-	-	2	-	20	30	50	2
9	BTEC-41P	Electronic Circuits Lab	-	-	2	-	20	30	50	2
10	BTEC-44P	Digital Electronics Lab.	-	-	2	-	20	30	50	2
11	BTEC-42P	Electronics Measurement Lab	-	-	2	-	20	30	50	2
12	BTGD-40	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

*Cyber Security will be offered as a compulsory audit course for which passing marks are 30% in End Semester
Examination and 40% in aggregate.

List of Open Electives for B. Tech. Courses

SCIENCE BASED OPEN ELECTIVE

BTOE-041	Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)
BTOE-042	Nano Sciences
BTOE-043	Laser Systems and Applications
BTOE-044	Space Sciences
BTOE-045	Polymer Science & Technology
BTOE-046	Nuclear Science
BTOE-047	Material Science
BTOE-048	Discrete Mathematics
BTOE-049	Applied Linear Algebra

STUDY AND EVALUATION SCHEME FOR

B.Tech (Electronics & Comm. Engineering).

SEMESTER - Fifth

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTEC-51	Integrated Circuits	4	1	-	-	50	100	150	3
2	BTEC-52	Principles of Communication	4	1	-	-	50	100	150	3
3	BTEC-53	Microprocessors	4	1	-	-	50	100	150	3
4	BTEC-54	Control System–I	4	1	-	-	50	100	150	3
5	BTEC-55	Antenna and Wave Propagation	4	1	-	-	25	50	75	2
6	BTMB-51	Engineering Economics	4	1	-	-	25	50	75	2
PRACTICA/DRAWING SUBJECTS										
7	BTEC-51P	Integrated Circuits Lab	-	-	2	-	20	30	50	2
8	BTEC-54P	Control System Lab	-	-	2	-	20	30	50	2
9	BTEC-52P	Communication Lab–1	-	-	2	-	20	30	50	2
10	BTEC-53P	Microprocessors Lab	-	-	2	-	20	30	50	2
11	BTGD-50	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

NOTE:- (1) Each period will be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilized for revision etc.

STUDY AND EVALUATION SCHEME FOR

B.Tech (Electronics & Comm. Engineering).

SEMESTER - Sixth

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTEC-61	Microwave Engineering	4	1	-	-	50	100	150	3
2	BTEC-62	Digital Communication	4	1	-	-	50	100	150	3
3	BTEC-63	Integrated Circuit Technology	4	1	-	-	50	100	150	3
4	BTEC-64	Digital Signal Processing	4	1	-	-	50	100	150	3
5	BTEC-65	Industrial Electronics	4	1	-	-	25	50	75	2
6	BTMB-61	Industrial Management	4	1	-	-	25	50	75	2
PRACTICA/DRAWING SUBJECTS										
8	BTEC-61P	Antenna and Microwave Lab	-	-	2	-	20	30	50	2
9	BTEC-62P	Communication Lab–II	-	-	2	-	20	30	50	2
10	BTEC-63P	CAD of Electronics Lab	-	-	2	-	20	30	50	2
11	BTEC-64P	Seminar	-	-	2	-	50	-	50	2
12	BTGD-60	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilized for revision etc.

STUDY AND EVALUATION SCHEME FOR

B.Tech (Electronics & Communication Engineering).

SEMESTER - seventh

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTOE-71	Quality Management	4	1	-	-	50	100	150	3
2	BTEC-71	Optical Communication	4	1	-	-	50	100	150	3
3	BTEC-72	Data Communication Network	4	1	-	-	50	100	150	3
4	BTEC-73	VLSI Design	4	1	-	-	50	100	150	3
5	BTEC-74	Information Theory & Coding	4	1	-	-	50	100	150	3
PRACTICA/DRAWING SUBJECTS										
8	BTEC-71P	Optical Communication & Networking Lab	-	-	2	-	20	30	50	2
9	BTEC-72P	Electronics Circuit Design Lab		-	2	-	20	30	50	2
10	BTEC-73P	Industrial Training & Viva	-	-	2	-	50	-	50	2
11	BTEC-74P	Project	-	-	2	-	50	-	50	2
12	BTGD-70	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

STUDY AND EVALUATION SCHEME FOR

B.Tech (Electronics & Communication Engineering).

SEMESTER - Eight

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	BTOE-81	Non Conventional Energy Resources	4	1	-	-	50	100	150	3
2	BTEC81	Digital System Design using VHDL	4	1	-	-	50	100	150	3
3	BTEC82	Wireless & Mobile Communication	4	1	-	-	50	100	150	3
4	BTEC83	Optical Network	4	1	-	-	50	100	150	3
PRACTICA/DRAWING SUBJECTS										
8	BTEC84P	Project	-	-	2	-	100	250	350	3
12	BTGD-80	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
								Grand Total	1000	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.

SEMESTER- III

[BTAS-31]Engg. Mathematics-III

Unit – I: Function of Complex variable

Analytic function, C-R equations, Harmonic Functions, Cauchy's integral theorem, Cauchy'sintegral formula, Derivatives of analytic functions, Taylor's and Laurent's series, Singularities,Zeroes and Poles, Residue theorem, Evaluation of real integrals of the type

Unit – II: Integral Transforms

Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems,Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensionalheat transfer equations, wave equations and Laplace equationsZ- transform and its application to solve difference equations.

Unit – III: Statistical Techniques

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of leastsquares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non –linear and multiple regression analysis, Binomial, Poisson and Normal distributions, Tests ofsignifications: Chi-square test, t-test

Unit – IV: Numerical Techniques – I

Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi methodand Newton-Raphson method, Rate of convergence of above methods.

Interpolation: Finite differences, Newton's forward and backward interpolation, Lagrange's andNewton's divided difference formula for unequal intervals**.**

Unit – V: Numerical Techniques –II

Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss-Seidal method.Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson's one third andthree-eight rules,Solution of ordinary differential equations (first order,second order and simultaneous) byEuler's, Picard's and fourth-order Runge- Kutta methods.

Test Books:-

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.

2. Jain, Iyenger Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi

Reference Books:-

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House,.

2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.

[BTEC-31] Network Analysis & Synthesis

UNIT-1

Signal analysis, complex frequency, network analysis, networksynthesis, General characteristics and descriptions of signals,step function and associated wave forms, The unit impulseIntroduction to network analysis, network elements, initial andfinal conditions, step and impulse response, solution of networkequations.

UNIT-2

Review of Laplace transforms, poles and zeroes, initial and finalvalue theorems, The transform circuit, Thevenin's and Norton'stheorems, the system function, step and impulse responses, theconvolution integral. Amplitude and phase responses.Network functions, relation between port parameters, transferfunctions using two port parameters, interconnection of twoports.

UNIT-3

Hurwitz polynomials, positive real functions.Properties of real immittance functions, synthesis of LC drivingpoint immittances, properties of RC driving point impedances,synthesis of RC impedances or RL admittances, properties ofRL impedances and RC admittances.

UNIT-4
Properties of transfer functions, zeroes of transmission,synthesis of Y21 and Z21 with 1Ω terminations.

UNIT-5
Introduction to active network synthesisActive Network Synthesis

Text Book:
1. Franklin F. Kuo, "Network Analysis and synthesis", 2nd Edition, Wiley India Pvt Ltd.
2. Behrouz Peikari, "Fundamentals of Network Analysis & synthesis", Jaico Publishing House, 2006.

Reference Books: M. E. Van Valkenberg, "Network Analysis", 2nd Edition, Prentice Hall of India Ltd.
Ghosh-Network Theory: Analysis and Synthesis, PHI Learning Pvt. Ltd

[BTEC-32]Fundamental of Electronic Devices

UNIT-1
Crystal Properties and charge Carriers in Semiconductors:Elemental and compound semiconductor materials, crystallattice structure,Bonding forces and energy bands in solids, charge carriersin semiconductors, carrier concentrations, drift of carriersin electric and magnetic fields.

UNIT-2
Excess Carriers in Semiconductors: Optical absorption,luminescence, carrier life time and photo conductivity,diffusion of carriers.

UNIT-3
Junction Properties: Equilibrium conditions, biasedjunctions, steady state conditions, reverse bias break down,transient and AC conditions.Metal semiconductor junctions.

UNIT-4

Transistors: Metal-semiconductor-field-effect-transistors(MESFET), Metal-insulator-semiconductor-field-effecttransistors(MISFET), Metal oxide semiconductor fieldeffect transistor (MOSFET): Construction, Operation andcharacteristics of above devices.Bipolar junction transistors: Fundamentals of BJToperation, amplification with BJTs.

UNIT-5

Some special devices:Photodiodes, photo detectors, solar cell, light emittingdiodes, semi-conductor lasers, light emitting materials.Tunnel Diode: degenerate semiconductors,IMPATT diode;The transferred electron mechanism: The GUNN diode.P-N-P-N diode, semiconductor controlled rectifier (SCR),bilateral devices: DIAC, TRIAC, IGBT.

Text Book: B. G. Streetman and S. Banerjee "Solid state electronics devices", 5th Edition, PHI.

Reference Books:1. Alok Dutta, "Semiconductor Devices and circuits", Oxford University Press.
2. Donald A Neaman, "Semiconductor Physics and Devices Basic Principles" 3rd Ed TMH India.

[BTEC-33]Signals and Systems

UNIT-1

Signals: Definition, types of signals and their representations:continuous-time/discrete-time, periodic/non-periodic, even/odd,energy/power, deterministic/ random, one-dimensional/multidimensional; commonly used signals (in continuous-time aswell as in discrete-time): unit impulse, unit step, unit ramp (andtheir interrelationships), exponential, rectangular pulse,sinusoidal; operations on continuous-time and discrete-timesignals (including transformations of independent variables).

UNIT-2

Laplace-Transform (LT) and Z-transform (ZT):

(i) One-sided LT of some common signals, important theoremsand properties of LT, inverse LT, solutions of differential
equations using LT, Bilateral LT, Regions of convergence(ROC)

(ii) One sided and Bilateral Z-transforms, ZT of some commonsignals, ROC, Properties and theorems, solution of differenceequations using one-sided ZT, s- to z-plane mapping

UNIT-3

Fourier Transforms (FT):

(i) Definition, conditions of existence of FT, properties,magnitude and phase spectra, Some important FT theorems,Parseval's theorem, Inverse FT, relation between LT and FT

(ii) Discrete time Fourier transform (DTFT), inverse DTFT,convergence, properties and theorems, Comparison betweencontinuous time FT and DTFT

UNIT-4

Systems: Classification, linearity, time-invariance and causality,impulse response, characterization of linear time-invariant (LTI)systems, unit sample response, convolution summation, stepresponse of discrete time systems, stability.

Convolution integral, co-relations, signal energy and energyspectral density, signal power and power spectral density,properties of power spectral density,

UNIT-5

Time and frequency domain analysis of systems

Analysis of first order and second order systems, continuous-time(CT) system analysis using LT, system functions of CT systems,poles and zeros, block diagram representations; discrete-timesystem functions, block diagram representation, illustration of theconcepts of system bandwidth and rise time through the analysisof a first order CT low pass filter

Text Book: P. Ramakrishna Rao, `Signal and Systems' 2008 Ed., Tata McGraw Hill, New Delhi

Reference Books:

Chi-Tsong Chen, `Signals and Systems', 3rd Ed., Oxford University Press, 2004

V. Oppenheim, A.S. Willsky& S. Hamid Nawab, 'Signals & System', Pearson Education, 2nd Ed., 2003.

[BTEC-34]Switching Theory & Logic Design

UNIT-1

Digital system and binary numbers: Signed binary numbers,binary codes.Gate-level minimization: The map method up to four variable,don't care conditions, POS simplification, NAND and NORimplementation, Quine Mc-Clusky method (Tabular method).

UNIT-2

Combinational Logic: Combinational circuits, analysisprocedure, design procedure, binary adder-subtractor, decimal
adder, binary multiplier, magnitude comparator, decoders,encoders, multiplexers

UNIT-3

Synchronous Sequential logic: Sequential circuits, storageelements: latches, flip flops, analysis of clocked sequential
circuits, state reduction and assignments, design procedure.Asynchronous Sequential logic: Analysis procedure, circuit
with latches, design procedure, reduction of state and flowtable, race free state assignment, hazards.

UNIT-4

Registers and counters: Shift registers, ripple counter,synchronous Counter, other counters.Memory and programmable logic: RAM, ROM, PLA, PAL.

Text Book: M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education

Reference Books:

1. Hill & Peterson, "Switching Circuit & Logic Design", Wiley.
2. Mohammad A. Karim and Xinghao Chen, "Digital Design-Basic concepts and Principles", CRC Press Taylor & Francis group, 2010.

[BTIP-31] Industrial Psychology

Unit-I

Introduction to Industrial Psychology – Definitions & Scope. Major influences on industrial Psychology-Scientific management and human relations schools Hawthorne Experiments

Unit-II

Individual in Workplace Motivation and Job satisfaction , stress management. Organizational culture, Leadership & group dynamics.

Unit-III

Work Environment & Engineering Psychology-fatigue. Boredom, accidents and safety. Job Analysis, Recruitment and Selection – Reliability & Validity of recruitment tests.

Unit –IV

Performance Management : Training & Development.

References :

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.

2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

3. Aamodt, M.G. (2007) Industrial/Organizational Psychology : An Applied Approach (5th edition) Wadsworth/Thompson : Belmont, C.A

. 4. Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill

[BTAC-31] Human Value & Professional Ethics

Module-1

Course introduction, Needs Basic guidelines

1 Understand the need , basic , guidelines content for process value education.
2. Self Exploration what is it? It content and process, Natural Acceptence and experiential Validation as the mechanism for self exploration.
3 Continues happiness and Prosperty- A look at continues human Aspiration.
4 Understanding Happiness and Prosperty correctly- A critical appraisal of the current senerio.
5 Method to fulfilled the human aspiration

Module -2

Understanding Harmony in human Being (Harmony in Myself)

1. Understanding Harmony as a co – existence of the sentient I and the Material Body.
2. Understanding the need of self (I) and body sukh and suvidha.

3. Understanding the body of an instrument of I (being Doar, seer and enjoyer.
4. Understanding the Charactersticks and activities of (I)

Module -3

Understanding harmony in the Family and Society

1. Understanding harmony in the Family and basic unit of Human interaction.
2. Understanding values in human – Human relationship meaning of nayaya and program for the fulfillment of ensure abhay and tripti.
3. Understanding the meaning of Vishvas difference between intension and competence.
4. Understanding the Harmony in the society (society being an Extension of family - samadhan , Samriddi , Abhay,sahastitva and comprehension of Human goals.

Module -4

Understanding the harmony in the Nature and existence – whole Existence as Co- existence.

1 Understanding the harmony in the Nature.
2 Interconnectedness and mutual fulfillment among the four order of Nature –recyclability ,and self regulation in nature.
3 Holistic prception of Harmony at all levels of existence.

Module – 5 Implication of the above Holistic understanding of Harmony on professional ethics.

1 Natural acceptance of human values.
2 Deffinativeness of ethical human conduct.
3 Basic for humanistic education. Humanstick constitution and human universal order.
4 Case studies of typical holistic technologies , Management model and Production system.
5 Strategy for transition from the presnt stage of universal order.
A - At the level of individual : as socialy and ecologically responsible engineers technologist and manager.
B- At the Level of Society as mutually enriching institution and organisations

[BTEC-31P]NETWORK ANALYSIS & SYNTHESIS LAB

1. Study and verification of network theorems with input signal of 1 kHz, 10kHz and 100kHz.
2. Verification of two port network parameters
3. Step and Ramp response of series and parallel RC circuits
4. Verification of properties of RC circuits
5. Verification of properties of RL circuits
6. Verification of properties of LC circuits
7. Verification of inverting, non-inverting and voltage follower VCVS circuits using 741 op-amp
8. Verification of inverting integrator using 741 op-amp
9. Design a finite gain differential amplifier with infinite input impedance and verify the output response.

[BTEC-35P]ELECTRONIC WORKSHOP & PCB LAB

1. Study of CRO, DMM & Function Generator
2. Identification of Active & Passive Components
3. Winding shop: Step down transformer winding of less than 5VA.
4. Soldering shop: Fabrication of DC regulated power supply
5. PCB Lab: (a) Artwork & printing of a simple PCB. (b) Etching & drilling of PCB.
6. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet.
7. Testing of regulated power supply fabricated.

[BTEC-34P] LOGIC DESIGN LAB

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.
9. Mini Project (Imp)

[BTEC-32P] ELECTRONIC DEVICES LAB

1. **Study of lab equipments and components:** CRO, Multimeter, Function Generator, Power supply-Active,Passive Components & Bread Board.
2. **P-N Junction Diode**: Characteristics of PN Junction diode-Static and dynamic resistance measurementfrom graph.
3. **Applications of PN junction diode**: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripplefactor-use of filter- ripple reduction (RC Filter)-Clipper & Clamper
4. **Properties of junctions** Zener diode characteristics. Heavy doping alters the reverse characteristics.Graphical measurement of forward and reverse resistance.

5. **Application of Zener diode:** Zener diode as voltage regulator. Measurement of percentage regulation byvarying load resistor.

6. **Characteristic of BJT**: BJT in CB and CE configuration- Graphical measurement of h parameters frominput and output characteristics. Measurement of Av, AI, Ro and Ri of CE amplifier with potential dividerbiasing.

7. **Characteristic of FET**: FET in common source configuration. Graphical measurement of its parametersgm, rd& m from input and output characteristics.

8. **Characteristic** of silicon-controlled rectifier.

9. **To plot** V-I Characteristics of DIAC.

10. **To draw** V-I characteristics of TRIAC for different values of Gate Currents.

SEMESTER- IV

[BTCS-45] Data Structure

UNIT-I

Introduction: Basic Terminology, Elementary Data Organization, Algorithm,Efficiency of an Algorithm, Time and Space Complexity, Asymptotic notations:Big-Oh, Time-Space trade-off. Abstract Data Types (ADT) Arrays: Definition,

Single and Multidimensional Arrays, Representation of Arrays: Row MajorOrder, and Column Major Order, Application of arrays, Sparse Matrices andtheir representations. Linked lists: Array Implementation and DynamicImplementation of Singly Linked Lists, Doubly Linked List, Circularly LinkedList, Operations on a Linked List. Insertion, Deletion, Traversal, PolynomialRepresentation and Addition, Generalized Linked List

UNIT--II

Stacks: Abstract Data Type, Primitive Stack operations: Push & Pop, Array andLinked Implementation of Stack in C, Application of stack: Prefix and PostfixExpressions, Evaluation of postfix expression, Recursion, Tower of HanoiProblem, Simulating Recursion, Principles of recursion, Tail recursion,Removal of recursionQueues, Operations on Queue: Create, Add, Delete, Full and Empty, Circularqueues, Array and linked implementation of queues in C, Dequeue and PriorityQueue.

UNIT-III

Trees: Basic terminology, Binary Trees, Binary Tree Representation: ArrayRepresentation and Dynamic Representation, Complete Binary Tree, AlgebraicExpressions, Extended Binary Trees, Array and Linked Representation ofBinary trees, Tree Traversal algorithms: In order, Preorder and Post order,Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

UNIT-IV

Graphs: Terminology, Sequential and linked Representations of Graphs:Adjacency Matrices, Adjacency List, Adjacency Multi list, Graph Traversal :Depth First Search and Breadth First Search, Connected Component, Spanning

Trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm.Transistive Closure and Shortest Path algorithm: Warshal Algorithm andDijikstra Algorithm, Introduction to Activity Networks

UNIT-V

Searching : Sequential search, Binary Search, Comparison and AnalysisInternal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two WayMerge Sort, Heap Sort, Radix Sort

Text book:

1. Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein “Data Structures Using Cand C++” , PHI

References
1. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publication
2. Jean Paul Trembley and Paul G. Sorenson, “An Introduction to Data Structures with applications”,McGraw Hill
3. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education
4. Lipschutz, “Data Structures” Schaum’s Outline Series, TMH
5. G A V Pai, “Data Structures and Algorithms”, TMH

[BTEC-41] Electronic Circuits

UNIT-I
Operational Amplifier: Inverting and non-inverting configurations,difference amplifier, Effect of finite open loop gain and bandwidth oncircuit performance, Large signal operation of op-amp.

UNIT-II
MOSFET: Review of device structure operation and V-I characteristics.Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOSamplifier circuits, small-signal operation and models, single stage MOSamplifier, MOSFET internal capacitances and high frequency model,frequency response of CS amplifier

UNIT-III
BJT: Review of device structure operation and V-I characteristics, BJTcircuits at DC, BJT as amplifier and switch, biasing in BJT amplifiercircuit, small-signal operation and models, single stage BJT amplifier,BJT internal capacitances and high frequency model, frequency responseof CE amplifier.

UNIT-IV
Differential Amplifier: MOS differential pair, small signal operation ofthe MOS differential pair, BJT differential pair, other non-idealcharacteristic of the Differential amplifier (DA), DA with active load.

UNIT-V
Feedback: The general feedback structure, properties of negative feedback, the four basic feedback topologies, the series-shunt feedbackamplifier, the series-series feedback amplifier, the shunt-shunt and shuntseriesfeedback amplifier.
Oscillators: Basic principles of sinusoidal oscillators, op-amp RCoscillator circuits, LC oscillator.
Text Book: A. S. Sedra and K. C. Smith, “Microelectronic Circuits”, Oxford University Press, 5th Ed.
Reference Books: Jacob Millman and Arvin Grabel, “Microelectronics”, 2nd Ed TMH

[BTEC-42] Electronic Measurements & Instrumentation

UNIT-I
Unit, dimensions and standards: Scientific notations and metric prefixes.SI electrical units, SI temperature scales, Other unit systems, dimensionand standards.Measurement Errors: Gross error, systematic error, absolute error andrelative error, accuracy, precision, resolution and significant figures,Measurement error combination, basics of statistical analysis.PMMC instrument, galvanometer, DC ammeter, DC voltmeter, series ohmmeter.

UNIT-II
Transistor voltmeter circuits, AC electronic voltmeter, currentmeasurement with electronic instruments, probesDigital voltmeter systems, digital multimeters, digital frequency metersystem.

UNIT-III
Voltmeter and ammeter methods, Wheatstone bridge, low resistancemeasurements, low resistance measuring instrumentsAC bridge theory, capacitance bridges, Inductance bridges, Q meter

UNIT-IV

CRO: CRT, wave form display, time base, dual trace oscilloscope,measurement of voltage, frequency and phase by CRO, Oscilloscopeprobes, Oscilloscope specifications and performance.Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSOapplications

UNIT-V
Instrument calibration: Comparison method, digital multimeters asstandard instrument, calibration instrumentRecorders: X-Y recorders, plotters

Text Book: David A. Bell, "Electronic Instrumentation and Measurements", 2nd Ed., PHI , New Delhi 2008.
Reference Books:
Oliver and Cage, "Electronic Measurements and Instrumentation", TMH, 2009.
Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (ButerworthHeinmann), 2008**.**

[BTEC-43] Electromagnetic Field Theory

UNIT-I
Coordinate systems and transformation: Cartesian coordinates, circularcylindrical coordinates, spherical coordinates
Vector calculus: Differential length, area and volume, line surface andvolume integrals, del operator, gradient of a scalar, divergence of avector and divergence theorem, curl of a vector and Stoke's theorem,Laplacian of a scalar.

UNIT-II
Electrostatics: Electrostatic fields, Coulombs law and field intensity,Electric field due to charge distribution, Electric flux density, Gausses'sLaw – Maxwell's equation, Electric dipole and flux lines, energy densityin electrostatic fields.
Electric field in material space: Properties of materials, convection andconduction currents, conductors, polarization in dielectrics, dielectricconstants, continuity equation and relaxation time, boundary condition.Electrostatic boundary value problems: Poission's and Laplace'sequations, general procedures for soling Poission's or Laplace'sequations, resistance and capacitance, method of images.

UNIT-III
Magnetostatics: Magneto-static fields, Biot-Savart's Law, Ampere'scircuit law, Maxwell's equation, application of ampere's law, magneticflux density- Maxwell's equation, Maxwell's equation for static fields,magnetic scalar and vector potential.Magnetic forces, materials and devices: Forces due to magnetic field,magnetic torque and moment, a magnetic dipole, magnetization inmaterials, magnetic boundary conditions, inductors and inductances,magnetic energy.

UNIT-IV
Waves and applications: Maxwell's equation, Faraday's Law,transformer and motional electromotive forces, displacement current,Maxwell's equation in final form.Electromagnetic wave propagation: Wave propagation in lossy
dielectrics, plane waves in lossless dielectrics, plane wave in free space,plain waves in good conductors, power and the pointing vector,reflection of a plain wave in a normal incidence.

Text Book: M. N. O. Sadiku, "Elements of Electromagnetics", 4th , Ed, Oxford University Press.
Reference Books: W. H. Hayt and J. A. Buck, "Electromagnetic field theory", 7th Ed., TMH.
Pramanik-Electromagnetism: Vol.1-Theory, PHI Learning Pvt. Ltd

[BTIS-41] Industrial Sociology

Unit-I Industrial Sociology: Nature,Scope and Importance of Industrial Sociology. Social Relations in Industry, Social Organization in Industry- Bureaucracy,Scientific Management and Human Relations**.**

Unit-II Rise and Development of Industry: Early Industrialism – Types of Productive Systems – The Manorial or Feudal system. The Guild system, The domestic or putting-out system,and the Factory system. Characteristics of the factory system.Causes and Consequences of industrialization.Obstacles to and Limitations of Industrialization**.**

Unit-III Industrialization in India: Industrial Policy Resolutions – 1956.Science.Technology andInnovation Policy of India 2013.

Unit-IV Contemporary Issues: Grievances and Grievance handling Procedure. Industrial Disputes:causes,Strikes and Lockouts.Preventive Machinery of Industrial Disputes:Schemes of Workers Participation in Management- Works Committee,Collective Bargaining, Bi-partite & Tri-partite Agreement,Code of Discipline,Standing Orders. Labour courts & Industrial Tribunals.

References : 1. GISBERT PASCAL, Fundamentals of Industrial sociology, Tata McGraw Hill Publishing Co., New Delhi, 1972.

2. SCHNEIDER ENGNO V., Industrial Sociology 2nd Edition, McGraw Hill Publishing Co., New Delhi, 1979.

3. MAMORIA C.B. And MAMORIA S., Dynamics of Industrial Relations in India.

[BTAC-41] Cyber Security

UNIT-1

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

UNIT-2

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce-Electronic Payment System, eCash,Credit/Debit Cards. Digital Signature, public KeyCryptography.

UNIT-3

Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control,CCTV and intrusion Detection Systems, Backup Security Measures.

UNIT-4

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, PolicyReview Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement ofthe Policies.Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India;

ITAct 2000 Provisions,Intellectual Property Law: Copy Right Law, Software License, Semiconductor Lawand Patent Law.

References :

1. Charles P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security ", Pearson Education India.

2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.

3.Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen kumar Shukla ,"Introduction to Information Security and Cyber Law" Willey Dreamtech Press.

SCIENCE BASED OPEN ELECTIVES
[BTOE-41] INTRODUCTION TO SOFT COMPUTING (Neural Networks, Fuzzy Logic and Genetic Algorithm)

Unit-I : Neural Networks-1(Introduction & Architecture)
Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions,Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

Unit-II : Neural Networks-II (Back propagation networks)
Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back operation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

Unit-III : Fuzzy Logic-I (Introduction)
Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

Unit-IV : Fuzzy Logic –II (Fuzzy Membership, Rules)
Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications&Defuzzificataions, Fuzzy Controller, Industrial applications.

Unit-V : Genetic Algorithm(GA)
Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Text Books:
1. S. Rajsekaran& G.A. VijayalakshmiPai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.

Reference Books:
3. SimanHaykin,"Neural Netowrks"Prentice Hall of India
4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

[BTOE-42] NANO SCIENCES

UNIT -1 :
Introduction:
Difinition of Nano-Science and Nano Technology, Applications of Nano-Technology.
Introduction to Physics of Solid State:

Structure: Size dependence of properties; crystal structures, face cantered cubicnanoparticles; Tetrahedral bounded semiconductor structures; lattice vibrations.
Energy Bands: Insulators, semiconductor and conductors; Reciprocal space; Energybands and gaps of semiconductors; effective masses; Fermi Surfaces.
Localized Particles: Acceptors and deep taps; mobility; Exactions.

UNIT-2
Quantum Theory For Nano Science:
Time dependent and time independent Schrodinger wave equations.Particle in a box, Potential step: Refelection and tunneling(Quantum leak). Penetration ofBarrier, Potential box(Trapped particle in 3D:Nanodot), Electron trapped in 2D plane(Nanosheet), Quantum confinerment effect in nano materials.
Quantum Wells, Wires and Dots
Preparation of Quantum Nanostructure; Size and Dimensionality effect, Fermigas;Potential wells; Partial confinement; Excitons; Single electron Tunneling, Infraredetectors; Quantum dot laser Superconductivity.
Properties of Individual Nano particles
Metal Nano clusters: Magic Numbers; Theoretical Modelling of Nanopraticles;geometric structure; electronic structure; Reactivity; Fluctuations Magnetic Clusters;Bulle to Nano structure.
Semi conducting Nanoparticles: Optical Properties; Photofragmentation; Coulmbicexplosion.
Rare Gas & Molecular Clusters: Inert gas clusters; Superfluid clusters molecularclusters.

UNIT-3
Growth Techniques of Nanomaterials:
Lithograpahic and Nonlithograpahic techniques, Sputtering and film deposition in glowdischarge, DC sputtering technique(p-$CuAlO_2$ deposition). Thermal evaporationtechnique, E-beam evaporation, Chemical Vapour deposition(CVD), Synthesis of carbonnano-fibres and multi-walled carbon nanotubes, Pulsed Laser Deposition, Molecularbeam Epitoxy, Sol-Gel Techniuqe (No chemistry required), Synthesis of nanowires/rods,Electrodeposition, Chemical bath deposition, Ion beam deposition system, Vapor-Liquid–Solid (VLS) method of nanowires.
UNIT -4
Methods of Measuring Properties:
Structure: Crystallography, particle size determination, surface structure,
Microscopy: Scanning Prob Microscopy (SPM), Atomic Force Microscopy (AFM),Field Ion Microscopy, Scanning Electron Microscopy, Transmission ElecrtronMicroscopy (TEM)
Spectroscopy: Infra red and Raman Spectroscopy, X-ray Spectroscopy, Magneticresonance, Optical and Vibrational Spectroscopy, Luninscence.
UNIT-5
Buckey Ball:
Nano structuresofcarbon(fullerene):
Carbon nano-tubes: Fabrication , structure. electrical, mechanical, and vibrationalproperties and applications.Nano diamond, Boron Nitride Nano-tubes, single elecron transistors, Moelcularmachine, Nano-Biometrics, Nano Robots.

Text/Reference Books:
1. C.P.Poole Jr F.J. Owens, "Introduction to Nanotechnology".
2. "Introduction to S.S. Physics" - (7^{th} Edn.) Wiley 1996.

[BTOE-43] LASER SYSTEMS AND APPLICATIONS

UNIT-I & II
Introduction:
Review of elementary quantum physics, Schrodinger equation, concept of coherence,absorption, spontaneous emission and stimulated emission processes, relation betweenEinstein's A and B coefficients, population inversion, pumping, gain, optical cavities.
UNIT-III & IV
Lasers & Laser Systems:

Main components of Laser, principle of Laser action, introduction to general lasers andtheir types. Three & four level Lasers, CW & Pulsed Lasers, atomic, ionic, molecular,excimer, liquid and solid state Lasers and systems, short pulse generation andMeasurement.

UNIT-V

Applications:

Laser applications in medicine and surgery, materials processing, opticalcommunication, metrology and LIDAR and holography.

Text/ Reference Books:

1. K.R. Nambiar, "Laser Principles, Types and Application" New Age International.
2. S. A. Ahmad, "Laser concepts and Applications" New Age Internati

[BTOE-44] SPACE SCIENCES

1. Introduction:

Introduction to space science and applications, historical development

2. Solar System:

Nebular theory of formation of our Solar System.Solar wind and nuclear reaction as the source of energy.

Sun and Planets: Brief description about shape size, period of rotation about axis andperiod of revolution, distance of planets from sun, Bode's law, Kepler's Laws ofplanetary motion, Newton's deductions from Kepler's Laws, Newton's Law ofgravitation, correction of Kepler's third law, determination of mass of earth,determination of mass of planets with respect to earth.Brief description of Asteroids, Satellites and Comets.

3. Stars:

Stellar spectra and structure, stellar evolution, nucleo-synthesis and formation ofelements.

Classification of stars: Harvard classification system, Hertzsprung-Russel diagram,

Luminosity of star, variable stars; composite stars (white dwarfs, Neutron stars, blackhole, star clusters, supernova and binary stars); Chandrasekhar limit.

4. Galaxies:

Galaxies and their evolution and origin, active galaxies and quasars.

5. Creation of Universe:

Early history of the universe, Big-Bang and Hubble expansion model of the universe,cosmic microwave background radiation, dark matter and dark energy.

Text Books / Reference Books:

1. K. S. Krishnaswami, "Astrophysics: A modern Perspective" New Age International.
2. K. S. Krishnaswami, "Understanding cosmic Panorama" New Age International.

[BTOE-45] POLYMER SCIENCE AND TECHNOLOGY

UNIT –I & II

POLYMERS:

Introduction, chemistry of polymer synthesis, polymer reaction kinetics, physical properties andcharacterization of polymers, effect of structure on properties of polymers, organic polymers.Introduction to high performance polymers and composites and their processing.

UNIT –III & IV

POLYMERIZATION:

Introduction, step-growth polymerization, free radical chain growth polymerization, emulsionpolymerization, ionic and cationic polymerization, chain statistics and rubber elasticity.

UNIT – UNIT –V & VI

PREPARATION AND APPLICATIONS:

Preparation, properties and technical applications of thermo-plastics (PVC, PVA), thermostats(PF, UF) and elastomers (SBR, GR-N), silicones.Application of polymers in space, ocean,electronics, medical, agriculture, automobile, sports and building construction.

[BTOE-46] NUCLEAR SCIENCE

UNIT-I

Nucleus and Its Basic Features:
Nuclear structure; nuclear forces and their properties, nuclear stability, nuclear radius and itsmeassurement, nuclear spin, nuclear magnetic and electrical moments.

UNIT-II

Nuclear Models:
Single particle model, liquid drop model and semi-emperical mass formula, nuclear potentialand shell model, collective model.

UNIT-III

Nuclear Reaction:
Nuclear reaction and laws of conservation, types of nuclear reaction, mechanism of nuclearreaction, nuclear fission & binuclear fusion and their explanation by liquid drop model.

UNIT-IV

Nuclear Decay:
Decay constant, half life period and mean life, alpha decay, beta decay, gamma decay,interaction of nuclear radiation with matter.

Nuclear Instruments-I
Mass spectrograph,: General principle, Aston's Mass Spectrograph.

UNIT-V

Nuclear Instruments-II
Accelerators: Van de Graph Generator, Cyclotron, Synchrotron.
Detectors: G M Counter, Scintillation counter, cloud chamber, Bubble Chamber, production anddetection of neutrons and Gamma-photon.
Application of Nuclear Techniques: Nuclear magnetic resonance, positron emissiontopography, radiotracer techniques and applications in material science and agriculture.

Text Books:
1. Tayal, "Nuclear Physics" Himalaya Publishing House.
2. S.N. Ghosal, "Nuclear Physics" S. Chand & Co.

Reference Books:
6. Roy & Nigam, "Nuclear Physics" John Wiley & sons.
7. W.E. Burcham, "Nuclear Physics" Longmans Publications.

[BTOE-47] MATERIAL SCIENCE

UNIT-I

Introduction: Historical perspective, importance of materials, Brief review of modern & atomicconcepts in Physics and Chemistry. Atomic models, Periodic table, Chemical bonding.

Crystallography and imperfections:
Concept of unit cell, space lattice, Bravais lattices, common crystal structures, Atomic packingfactor and density. Miller indices.X-ray crystallography techniques, imperfections, Defects &Dislocations in solids. .

UNIT-II

Mechanical Properties and Testing: Stress strain diagram, Ductile and brittle materials, stressVs strength, toughness, hardness, fracture, fatigue and creep. Testing, such as Strength testing,Hardness testing, Impact testing, Fatigue testing Creep testing, Non-destructive testing (NDT)
Micro Structural Exam: Microscope principle and methods, Preparation of samples andmicrostructure exam and grain size determination, comparative study of microstructure ofvarious metals and alloys, such as Mild steel, CI, Brass.
Phase Diagram and Equilibrium Diagram: Uniary and Binary diagrams, Phase rules, Types ofequilibrium diagrams: solid solution type, eutectic type and combination type, Iron-carbonequilibrium diagram.

UNIT-III

Ferrous materials: Iron and steel manufacture, furnaces, various types of carbon steels, alloysteels and cast irons, its properties and uses.
Heat Treatment: various types of heat treatment, such as Annealing, Normalizing, Quenching,Tempering and Case hardening. Time Temperature Transformation (TTT) diagrams.
Non-Ferrous metals and alloys: Non-ferrous metals, such as Cu, Al, Zn, Cr, Ni etc. and itsapplications. Various types of Brass, Bronze bearing materials their properties and uses.Aluminum alloys, such as Duralumin, Other advanced materials/alloys.

UNIT-IV

Magnetic properties: Concept of magnetism- Dia, para, ferro magnetic materials, Hysteresis,Soft and hard magnetic materials, Magnetic Storages.
Electric Properties: Energy band, concept of conductor, insulator and semi conductor. Intrinsicand extrinsic semi-conductors, P-n junction and transistors, Basic devices and their applications.diffusion of Solid
Super conductivity and its applications, Messier effect. Type I& II superconductors. HighTemp. superconductors.
UNIT-V
Ceramics: Structure, types, properties and applications of ceramics. Mechanical/Electricalbehaviour and processing of ceramics.
Plastics: Various types of polymers/plastics and their applications. Mechanical behaviour andprocessing of plastics, Future of plastics.
Other Materials: Brief description of other materials, such as optical and thermal materials,concrete, composite materials and their uses.
Other Materials: Brief description of other materials, such as optical and thermal materials,concrete, composite materials and their uses.
Performance of materials in service: Brief theoretical consideration of fracture, fatigue, andcorrosion and its control.
Text / Reference Books:
1. W.D. Callisster Jr. "Material Science & Engineering Addition" - Wesly Publishing Co.
2. Van Vlash, "Elements of Material Science & Engineering", John Wiley & Sons

[BTOE-48] DISCRETE MATHEMATICS

UNIT-I
Set Theory: Definition of Sets, Venn Diagrams, complements, cartesian products, powersets, counting principle, cardinality and countability (Countable and Uncountable sets),proofs of some general identitites on sets, pigeonhole principle.
Relation: Definition, types of relation, composition of relations, domain and range of arelation, pictorial representation of relation, properties of relation, partial ordering relation.
Function: Definition and types of function, composition of functions, recursively definedfunctions.
UNIT-II
Propositional logic: Proposition logic, basic logic, logical connectives, truth tables,tautologies, contradiction , normal forms(conjunctive and disjunctive), modus ponens andmodus tollens, validity, predicate logic, universal and existential quantification.
Notion of proof: proof by implication, converse, inverse, contrapositive, negation, andcontradiction, direct proof, proof by using truth table, proof by counter example.
UNIT-III
Combinatories: Mathematical induction, recursive mathematical definitions, basics ofcounting, permutations, combinations, inclusion-exclusion, recurrence relations (n_{th} orderrecurrence relation with constant coefficients, Homogeneous recurrence relations,Inhomogeneous recurrence relation), generating function (closed form expression, propertiesof G.F., solution of recurrence relation using G.F, solution of combinatorial problem usingG.F.)
Unit-IV
Algebraic Structure: Binary composition and its properties definition of algebraic structure;Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, PermutationGroups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).
UNIT-V
Graphs:
Graph terminology, types of graph connected graphs, components of graph, Euler graph,Hamiltonian path and circuits, Graph coloring, Chromatic number.
Tree: Definition, types of tree(rooted, binary), properties of trees, binary search tree, treetraversing (preorder, inorder, postorder).

Finite Automata: Basic concepts of Automation theory, Deterministic finiteAutomation(DFA), transition function, transition table, Non Deterministic Finite Automata(NDFA), Mealy and Moore Machine, Minimization of finite Automation.

Text/Reference Books:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Mc.Graw Hill, 2002.
2. V. Krishnamurthy, "Combinatories:Theory and Applications", East-West Press.

[BTOE-49] APPLIED LINEAR ALGEBRA

UNIT-1

Fields, Vector-spaces, sub-spaces, linear-combination, linear-dependence and independence.Basis, dimensions and coordinates (each and every fact to be illustrated by suitable examples).

UNIT-2

Linear-transformation, definition and examples, matrix representation, similarity, range andkernel, rank-nullity theorem and its consequences.

UNIT-3

Singular and non singular linear transformations, sum and product of linear transformations,vector space of linear transformations, nilpotent linear transformations.

UNIT-4

Inner product spaces, definition and examples, orthogonality, Cauchy-Schwartz Inquality,Minkowski Inequality, polarization Identity, complete ortho normal set, Bessel's Inequality,Gram-Schmidt's orthogonalization process.

UNIT-5

Linear functional, definition and examples, vector space of linear functional, dual vector spaces,adjoint, self adjoint, unitary and normal operators, examples and properties, eigen values andeigen vectors, diagonalisation of linear operators, quadratic forms, principle axistheorem(without proof), some applications to engineering problems.

TEXT/REFERENCE BOOKS

1. Dym, H. Linear Algebra in action, University Press.2012
2. Halmos, P.R.: Finite Dimensional Vector Spaces (1990) Narosa.

SEMESTER- V

[BTEC-51] Integrated Circuits

UNIT 1

Analog Integrated circuit Design: an overview: Current Mirrors using BJT and MOSFETs, Simple current Mirror, Base current compensated current Mirror, Wilson and Improved Wilson Current Mirrors, Wilder Current source and Cascade current Mirror

The741ICOp-Amp: Bias circuit, short circuit protection circuitry, the input stage, the second stage, the output stage, and device parameters; D**C** Analysis of 741: Small Signal Analysis of input stage, the second stage, the output stage; Gain, Frequency Response of 741; a Simplified Model, Slew Rate, Relationship Between ft and SR

UNIT 2

Linear Applications of IC op-amps: An Overview of Op-Amp (ideal and non-ideal) based Circuits V-I and I-V converters, generalized Impedance converter, simulation of inductors

Filters: First and second order LP, HP, BP BS and All pass active filters, KHN.

UNIT 3

Digital Integrated Circuit Design-An Overview: CMOS Logic Gate Circuits**:** Basic Structure CMOS realization of Inverters, AND, OR, NAND and NOR Gates

Latches and Flip flops: The Latch, The SR Flip-flop, CMOS Implementation of SR Flip flops, A Simpler CMOS Implementation of the Clocked SR Flip-flop, D Flip-flop Circuits.

UNIT 4

Non-Linear applications of IC Op-amps: Log–Anti Log Amplifiers, Precision Rectifiers, Peak Detectors, Simple and Hold Circuits, Analog Multipliers and their applications. Op- amp as a comparator, Zero crossing detector, Schmitt Trigger, Astable multivibrator, Mono stable multivibrator, Generation of Triangular Waveforms

UNIT 5

D/A and A/D converters

Integrated Circuit Timer: The 555 Circuit, Implementing a Monostable Multivibrator Using the 555 IC, Astable Multi vibrator Using the 555 IC.

Phase locked loops (PLL): Ex-OR Gates and multipliers as phase detectors**,** Block Diagram of IC PLL, Working of PLL and Applications of PLL.

Text Books:

1. Sedra and Smith,"MicroelectronicCircuits",6th Edition, Oxford University Press.
2. MichaelJacob,"ApplicationsandDesignwithAnalogIntegratedCircuits",PHI,2nd Edition.

Reference Books:

1. Jacob Millman and Arvin Grabel, "Microelectronics", 2nd Edition, Tata Mc Graw Hill.
2. Behzad Razavi, "Fundamentals of Microelectronics",2nd Edition, Wiley.
3. Mark N. Horenstein, "Microelectronic Circuits and Devices", PHI.
4. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis and Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley.

[BTEC-52] Principles of Communication

Unit 1

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

Unit 2

Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulators and Demodulators, Approximately Compatible SSB Systems, Stereophonic FM Broadcasting, Examples Based on MatLab.

Unit 3

Pulse Modulation, Digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse Position Modulation. Their generation and Demodulation, Digital Representation of Analog Signals, Pulse Code Modulation (PCM), PCM System, Issues in digital transmission: Frequency Division Multiplexing, Time Division Multiplexing, Line Coding and their Power Spectral density, T1 Digital System,

Unit 4

Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Voice Coders, Sources of Noises, Frequency domain representation of Noise, Super Position of Noises, Linear filtering of Noises, Mathematical Representation of Noise.

Unit 5

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

Text Book:

1. HerbertTaubandDonaldL.Schilling,"PrinciplesofCommunicationSystems",TataMcGrawHill.

Reference Books:

1. B.P.Lathi,"ModernDigitalandAnalogcommunicationSystems",3rd Edition, Oxford University Press.
2. SimonHaykin,"CommunicationSystems",4th Edition, Wiley India.
3. H.P.Hsu&D.Mitra,"AnalogandDigitalCommunications",2nd Edition,TataMcGraw-Hill.

[BTEC-53] MICROPROCESSORS

Unit1

Evolution of microprocessors, Microprocessor architecture and its operations, 8085 pins description, programming model, basic interfacing concepts, input and output devices, logic devices and memory interfacing, addressing modes, Concept of instruction cycle, machine cycle and T-states, Concept of interrupts, Classification of 8085 instructions.

Unit 2

8086 architecture- functional diagram, register organization, memory segmentation, programming model, memory address, physical memory organization, pins description, clock generator 8284A, maximum mode and minimum mode signal descriptions, timing diagrams, introduction to DOS and BIOS interrupts.

Unit 3

Instruction formats, addressing modes, classification of instruction set, assembler directives (debug, TASM & MASM), macros, Programs techniques and assembly language programs: simple programs involves data transfer operation, arithmetic operation, logical operation, branch operation, machine control operation, string manipulations, stack and subroutine operations.

Unit 4.

8255 Programmable peripheral interfacing various mode of operation to 8086, interfacing keyboard and seven segment display, stepper motor interfacing, D/A and A/D converter, 8254 (8253) programmable interval timer, Direct Memory Access and 8237 DMA controller.

Unit 5

Memory interfacing to 8086. Interrupt structure of 8086, interrupt handling, vector interrupt table and interrupt Service routine. Interfacing interrupt controller 8259 and DMA Controller 8257 to 8086. Serial communication standards, Serial data transfer schemes.

Text Book:

1. Ramesh Gaonkar, "Microprocessor architecture, programming and applications with the 8085",5th Edition, Penram International Publication(India) Pvt. Ltd.
2. DouglasV.Hall, "Microprocessors and Interfacing",2ndEdition,TataMcGrawHill.

Reference Books:

1. SivaramaP. Dandamudi, "Introduction to Assembly Language Programing From 8086 to Pentium Processors",Springer.
2. Walter A. Triebeland Avtar Singh, "The 8088 and 8086 Microprocessors: Programming, Interfacing Software,HardwareandApplications",Pearson.
3. A.K.RayandK.M.Bhurchandi,"AdvancemicroprocessorsandPeripherals"TataMcGrawHill.
4. LylaB.Das,"TheX86Microprocessors, Architecture, Programming andInterfacing(8086toPentium)", Pearson.

[BTEC-54] Control System–I

Unit 1

Basic Components of a control system, Feedback and its effect, types of feedback control systems. Block diagrams Reduction and signal flow graphs, Modeling of Physical systems: electrical networks, mechanical systems elements, equations of mechanical systems, sensors and encoders in control systems, DC motors in control systems.

Unit 2

State-Variable Analysis: Vector matrix representation of state equation, state transition matrix, state-transition equation, relationship between state equations and high-order differential equations, relationship between state equations and transfer functions. Similarity Transformation, Decomposition of transfer functions, Controllability and observability.

Unit 3

Time domain Analysis of Control Systems: Time response of continuous data systems, typical test signals for the time response of control systems, the unit step response and time- domain specifications, Steady-State error, time response of a first order system, transient response of a prototype second order system.

Unit 4

Stability of Linear Control Systems: Bounded-input bounded-output stability continuous data systems, zero-input and asymptotic stability of continuous data systems, methods of determining stability, Routh Hurwitz criterion. Root-Locus Technique: Introduction, Properties of the Root Loci, Design aspects of the Root Loci

Unit 5

Frequency Domain Analysis: M_r (resonant peak) and ω_r (resonant frequency) and bandwidth of the prototype Second order system, effect so fading a zero to the forward path, effect so fadding a pole to the forward path, Nyquist ability criterion, relative stability: gain margin and phase margin, stability analysis with The Bode plot.

Text Book:

1. B.C. Kuo & Farid Golnaraghi, "AutomaticControlSystems",8th Edition, John Wiley India.

Reference Books:

1. WilliamA.Wolovich,"AutomaticControlSystems",OxfordUniversityPress.
2. Joseph J. DistefanoIII, AllenR.Stubberud,Ivan J.Williams,"FeedbackandControlSystems"Schaums Outlines Series,3rdEdition, Tata Mc Graw Hill.
3. I.J.Nagrath&M.Gopal,"ControlSystemEngineering",NewAgeInternationalPublishers.

[BTEC-55] Antenna and Wave Propagation

Unit1

Antennas Basics: Introduction, Basic Antenna Parameters, Patterns, Beam Area(or Beam Solid Angle) ΩA, Radiation Intensity, Beam Efficiency, Directivity D and Gain G, Directivity and Resolution, Antenna Apertures, Effective Height, The radio Communication link, Fields from Oscillating Dipole, Single-to-Noise Ratio (SNR), Antenna Temperature, Antenna Impedance.

Unit 2

Point Sources and Their Arrays: Introduction, Point Source, Power Theorem and its Application to an Isotropic Source, Radiation Intensity, Arrays of Two Isotropic Point Sources, Non-isotropic but Similar Point Sources and the Principle of Pattern Multiplication, Pattern Synthesis by Pattern Multiplication, Linear Arrays of n-Isotropic Point Sources of Equal Amplitude and Spacing, Linear Broadside Arrays with Non-uniform Amplitude Distributions. General Considerations.

Electric Dipoles, Thin Liner Antennas and Arrays of Dipoles and Apertures: The Short Electric Dipole, The Fields of a Short Dipole, Radiation Resistance of Short Electric Dipole, Thin Linear Antenna, Radiation Resistance of λ/2 Antenna, Array of Two Driven λ/2 Elements: Broadside Case and End-Fire Case, Horizontal Antennas Above a Plane Ground, Vertical Antennas Above a Plane Ground, Yagi - Uda Antenna Design, Long - Wire Antennas, folded Dipole Antennas.

Unit 3

The Loop Antenna: Design and its Characteristic Properties, Application of Loop Antennas, Far Field Patterns of Circular Loop Antennas with Uniform Current, Slot Antennas, Horn Antennas, Helical Antennas, The Log-Periodic Antenna, Micro strip Antennas.

Reflector Antennas: Flat Sheet Reflectors, Corner Reflectors, The Parabola-General Properties, A Comparison Between Parabolic and Corner Reflectors, The Paraboloidal Reflector, Patterns of Large Circular Apertures with Uniform Illumination, Reflector Types (summarized), Feed Methods for Parabolic Reflectors.

Text Book:

1. John D Krauss, Ronald J Marhefkaand Ahmad S.Khan, "Antennas and Wave Propagation", Fourth Edition,TataMcGrawHill.

Reference Books:

1. A.R.Harish,M. Sachidananda,"Antennas and Wave Propogation", Oxford University Press.
2. Edward Conrad Jordan and Keith George Balmain,"Electromagnetic Waves and Radiating Systems", PHI.
3. A.Das, Sisir K.Das,"Microwave Engineering",TataMcGrawHill.

[BTMB-51] Engineering Economics

Unit-1 Introduction to Engineering Economics and Managerial Economics Concept of Efficiency, Theory of Demand , Elasticity of Demand, Supply and Law of Supply indifference Curves, Budget Line, Welfare Analysis, Scope of Managerial Economics, Techniques and Applications of Managerial Economics.

Unit-2 Market Structure Perfect Competitions Imperfect- Monopolistic, Oligopoly, duopoly sorbent features of price determination and various market conditions.

Unit-3 Demand Forecasting and cost Estimation Characteristics of Forecasts, Forecasting Horizons, Steps to Forecasting, Forecasting Methods, Seasonal Adjustments, Forecasting Performance Measures, Cost Estimation, Elements of cost, Computation of Material Variances Break-Even Analysis.

Unit-4 Management Aspects Functions of Management, Project Management, Value Engineering, Project Evaluation, Decision Making.

LABOROTARY

[BTEC-51P]: Integrated Circuit Lab

Objective:- To design and implement the circuits to gain knowledge on performance of the circuit and its application. These circuits should also be simulated on P-spice.

1. Log and antilog amplifiers.
2. Voltage comparator and zero crossing detectors.
3. Second order filters using operational amplifier for–
    a. Low pass filter of cut off frequency 1 KHz.
    b. High pass filter of frequency 12KHz.
    c. Band pass filter with unit gain of pass band from 1 KHz to 12 KHz.
4. Wien bridge oscillator using operational amplifier.
5. Determine capture range; lock in range and free running frequency of PLL.
6. Voltage regulator using operational amplifier to produce output of 12V with maximum load current of 50mA.
7. A/D and D/A convertor.
8. Voltage to current and current to voltage convertors.
9. Function generator using operational amplifier (sine, triangular & square wave)
10. Astable and mono stable multi vibrator using IC 555.

[BTEC-54P] Control System Lab

1. Different Tool boxes in MATLAB, Introduction to Control Systems Toolbox.
2. Determine transpose, inverse values of given matrix.
3. Plot the pole-zero configuration in s-plane for the given transfer function.
4. Determine the transfer function for given closed loop system in block diagram representation.
5. Plot unit step response of given transfer function and find peak overshoot, peak time.
6. Plot unit step response and to find rise time and delay time.
7. Plot locus of given transfer function, locate closed loop poles for different values of k.
8. Plot root locus of given transfer function and to find out S, Wd, Want given root & to discuss stability.

9. Plot bode plot of given transfer function.
10. Plot bode plot of given transfer function and find gain and phase margins
11. Plot Nyquist plot for given transfer function and to compare the irrelative stability
12. Plot the Nyquist plot for given transfer function and to discuss closed loop stability, gain and phase margin.

Note:-In addition, Institutes may include more experiments based on the expertise.

[BTEC-52P]Communication
Lab–1

1. To study DSB/SSB amplitude modulation & determine its modulation factor & power in sidebands.
2. To study amplitude demodulation by linear diode detector
3. To study frequency modulation and determine its modulation factor
4. To study PLL 565 as frequency demodulator.
5. To study sampling and reconstruction of Pulse Amplitude modulation system.
6. To study the Sensitivity, Selectivity, and Fidelity characteristics of super heterodyne receiver.
7. To study Pulse Amplitude Modulation a. using switching method
   b. by sample and hold circuit
8. To demodulate the obtained PAM signal by 2^{nd} order LPF.
9. To study Pulse Width Modulation and Pulse Position Modulation.
10. To plot the radiation pattern of a Dipole, Yagi-uda and calculate its beam width.
11. To plot the radiation pattern of Horn, Parabolic & helical antenna. Also calculate beam width & element current.
12. Design and implement an FM radio receiver in 88-108 MHz.

[BTEC-53P] Microprocessors Lab

1. Write a program using 8085/8086 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
2. Write a program using 8085/8086 Microprocessor for addition and subtraction of two BCD numbers.
3. To perform multiplication and division of two 8 bit numbers using 8085/8086.
4. To find the large stand smallest number in an array of data using 8085/8086 instruction set.
5. To write a program to arrange an array of data in ascending and descending order using 8085/8086.
6. To convert given Hexadecimal number in to its equivalent ASCII number and vice versa using 8085/8086 instruction set.
7. To write a program to initiate 8251 and to check the transmission and reception of character.
8. To interface 8253 programmable interval timer to 8085/8086 and verify the operation of 8253 in six different modes.
9. To interface DAC with 8085/8086 to demonstrate the generation of square, sawtooth and triangular wave.
10. Serial communication between two 8085/8086 through RS-232 C-port.

SEMESTER- VI

[BTEC-61] Microwave Engineering

Unit1

Rectangular Wave Guide: Field Components, TE, TM Modes, Dominant TE_{10} mode, Field Distribution, Power, Attenuation. Circular Waveguides: TE, TM modes. Wave Velocities, Microstrip Transmission line (TL), Coupled TL, Strip TL, Coupled Strip Line, Coplanar TL, Microwave Cavities,

Unit2

Scattering Matrix, Passive microwave devices: Microwave Hybrid Circuits, Terminations, Attenuators, Phase Shifters, Directional Couplers: Two Hole directional couplers, S-Matrix of a Directional coupler, Hybrid Couplers, Microwave Propagation in ferrites, Faraday Rotation, Isolators, Circulators, S parameter analysis of all components.

Unit3

Microwave Tubes: Limitation of Conventional Active Devices at Microwave frequency, Two Cavity Klystron, Reflex Klystron, Magnetron, Traveling Wav Tube, Backward Wave Oscillators: Their Schematic, Principle of Operation, Performance Characteristic and their applications.

Unit4

Solid state amplifiers and oscillators: Microwave Bipolar Transistor, Microwave tunnel diode, Microwave Field-effect Transistor, Transferred electron devices, Avalanche Transit

Unit5

Microwave Measurements: General setup of a microwave test bench, Slotted line carriage, VSWR Meter, microwave power measurements techniques, Crystal Detector, frequency measurement, wavelength measurements, Impedance and Refection coefficient, VSWR, Insertion and attenuation loss measurements, measurement of antenna characteristics, microwave link design.

Text Book:

1. SamuelY.Liao,"MicrowaveDevicesandCircuits",3rdEdition, Pearson Education.

Reference Books:

1. R.ECollin,"FoundationforMicrowaveEngineering",2ndEdition, John Wiley India.
2. A.DasandS.K.Das,"MicrowaveEngineering", Tata Mc Graw Hill.

[BTEC-62] Digital Communication

Unit 1

Digital Data transmission, Line coding review, Pulse shaping, Scrambling, Digital receivers, Eye diagram, Digital carrier system, Method of generation and detection of coherent & non-coherent binary ASK,FSK &PSK, Differential phase shift keying, quadrature modulation techniques.(QPSK and MSK), M-array Digital carrier Modulation.

Unit 2

Concept of Probability, Random variable, Statistical averages, Correlation, Sum of Random Variables, Central Limit Theorem, Random Process, Classification of Random Processes, Power spectral density.

Unit 3

Performance Analysis of Digital communication system: Optimum linear Detector for Binary polar signaling, General Binary Signaling, Coherent Receivers for Digital Carrier Modulations, Signal Space Analysis of Optimum Detection, Vector Decomposition of White Noise Random processes, General Expression for Error Probability of optimum receivers,

Unit 4

Spread spectrum Communications: Frequency Hopping Spread Spectrum (FHSS) systems, Direct Sequence Spread Spectrum, Code Division Multiple Access of DSSS, Multiuser Detection, OFDM Communications

Unit5

Measure of Information, Source Encoding, Error Free Communication over a Noisy Channel capacity of a discrete and Continuous Memory less channel Error Correcting codes: Hamming sphere, hamming distance and Hamming bound, relation between minimum distance and error detecting and correcting capability, Linear block codes, encoding & syndrome decoding; Cyclic codes, encoder and decoders for system attic cycle codes; convolution codes, code tree & Trellis diagram,

Text Book:

1. B.P. Lathi, "ModernDigitalandAnalogcommunicationSystems",4th Edition, Oxford University Press.

Reference Books:

1. H.Taub, D.L.Schilling, G.Saha,"PrinciplesofCommunication",3rdEdition,TataMcGraw-Hill.
2. JohnG.Proakis,"DigitalCommunications", 4th Edition, Mc Graw-Hill International.
3. SimonHaykin,"CommunicationSystems",4thEdition, Wiley India.
4. H.P.HSUandD.Mitra,"AnalogandDigitalCommunications",2nd Edition, Tata McGraw-Hill.

[BTEC-63] Integrated Circuit Technology

Unit 1

Introduction To IC Technology: SSI, MSI, LSI, VLSI Integrated Circuits Crystal Growth and Wafer Preparation: Electronic Grade Silicon, Czochralski Crystal Growth, Silicon Shaping, Processing Considerations. Epitaxy: Vapor Phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators, Epitaxial Evaluation.

Unit 2

Oxidation: Growth Kinetics, Thin Oxides, Oxidation Techniques and Systems, Oxides Properties. Lithography: Optical Lithography. Photomasks, Wet Chemical Etching. Dielectric and Polysilicon Film Deposition: Deposition Processes, Polysilicon, Silicon Dioxide, Silicon Nitride.

Unit 3

Diffusion: Diffusion of Impurities in Silicon and Silicon Dioxide, Diffusion Equations, Diffusion Profiles, Diffusion Furnace, Solid, Liquid and Gaseous Sources, Sheet Resistance and its Measurement Ion-Implantation: Ion-Implantation Technique, Range Theory, Implantation Equipment.

Unit 4

Metallization: Metallization Application, Metallization Choices, Physical Vapor Deposition, Vacuum Deposition, Sputtering Apparatus. Packaging of VLSI devices: Package Types, Packaging Design Consideration, VLSI Assembly Technologies, Package Fabrication Technologies.

Unit5

VLSI Process Integration: Fundamental Considerations For IC Processing, NMOS IC Technology, CMOS IC Technology, Bipolar IC Technology, Monolithic and Hybrid Integrated Circuits, IC Fabrication

Text Books:

1. S.M.Sze, "VLSI Technology",2nd Edition, Mc Graw–Hill Publication.
2. S.K.Ghandhi, "VLSI Fabrication Principles",2nd Edition,Willy-India Pvt. Ltd.

Reference Books:

1. J. D. Plummer, M. D. Deal and Peter B. Griffin, "Silicon VLSI Technology: Fundamentals, practice and modelling", Pearson Education.
2. StephenA.Campbell,"Fabrication Engineering at the micro and nano scale",Oxford University Press.

[BTEC-64] Digital Signal Processing

Unit1

Realization of Digital Systems: Introduction, direct form realization of IIR systems, cascade realization of an IIR systems, parallel form realization of an IIR systems, Ladder structures: continued fraction expansion of H(z), example of continued fraction, realization of a ladder structure, example of a ladder realization

Unit2

Design of Infinite Impulse Response Digital Filters: Introduction to Filters, Impulse Invariant Transformation, Bi-Linear Transformation, All-Pole Analog Filters: Butterworth and Chebyshev, Design of Digital Butterworth and Chebyshev Filters.

Unit3

Finite Impulse Response Filter Design: Windowing and the Rectangular Window, Other Commonly Used Windows, Examples of Filter Designs Using Windows, The Kaiser Window.

Unit4

Discrete Fourier Transforms: Definitions, Properties of the DFT, Circular Convolution, Linear Convolution.

Unit5

Fast Fourier Transform Algorithms: Introduction, Decimation –In Time (DIT) Algorithm, Computational Efficiency, Decimation in Frequency (DIF) Algorithm.

Text Book:

1. Johnny R. Johnson, "Digital Signal Processing",PHI.

Reference Books:

1. John G Prokias, Dimitris G Manolakis,"Digital Signal Processing",Pearson Education.
2. Oppenheim & Schafer, "Digital Signal Processing"PHI.
3. SanjitK.Mitra,"DigitalSignalProcessing:AComputer-BasedApproach",4th Edition, Mc Graw Hill.
4. Monson Hayes, "Digital Signal Processing",2nd Edition, Mc Graw Hill Education

[BTEC-65] Industrial Electronics

Unit 1

Power Semiconductor Devices: Power semiconductor devices their symbols and static characteristics and specifications of switches, types of power electronic circuits Operation, steady state & switch characteristics & switching limits of Power Transistor Operation and steady state characteristics of Power MOSFET and IGBT Thyristor– Operation V-I characteristics, two transistor model, methods of turn-on Operation of GTO ,MCT and TRIAC

Unit 2

Phase Controlled Rectifiers: Phase Angle Control, Single-phase Half-wave Controlled Rectifier (One quadrant), Single-phase Full-wave Controlled Rectifier (Two quadrant Converters), Performance Factors of Line-commutated Converters, The Performance Measures of Two-pulse Converters, Three phase Controlled Converters **Inverters:** Introduction Thyristor Inverter Classification, Series Inverters, Parallel Inverter, Three-phase Bridge Inverters, Three-phase Bridge Inverter with Input-circuit Commutation

.

Unit 3

Choppers: Introduction, Principle of Chopper Operation, Control Strategies, step-up/Down Chopper, Jones Chopper. Introduction to basic Cyclo - converters.

Control of D.C. Drives: Introduction, Basic Machine Equations, Breaking Modes, Schemes for D.C. Motor Speed Control, Single-phase Separately Excited Drives, Braking Operation of Rectifier Controlled Separately excited Motor, Single phase Separately Excited Drives, Power Factor Improvement, Three-phase Separately Excited Drives, D.C. Chopper Drives

Unit 4

Control of A.C. Drives: Introduction, basic Principle of Operation, Squirrel-cage Rotor Design, Speed Control of Induction Motors, stator Voltage Control, Variable Frequency control, Rotor Resistance Control, Slip Power Recovery Scheme, Synchronous Motor Drives

Text Books:

1. M.H.Rashid,"PowerElectronics",3rdEdition,PearsonEducation.

Reference Books:

1. M.D. Singh & K. Khanchandani, "Power Electronics", Tata Mc Graw Hill.
2. V.R .Moorthy, "Power Electronics: Devices, Circuits and Industrial Applications", Oxford University Press, 2007.
3. M.S. Jamil Asghar, "Power Electronics", PHI.
4. Ned Mohan, T.M. Undelandand W.P. Robbins, "Power Electronics: Converters, Applications and Design", Wiley India

BTMB-61 : INDUSTRIAL MANAGEMENT

Unit-I Introduction: Concept, Development, application and scope of Industrial Management. Productivity: Definition, measurement, productivity index, types of production system, Industrial Ownership.

Unit-II Management Function: Principle of Management – Time and motion study, work simplification – process charts and flow diagrams, Production Planning.

Unit-III Inventory Control: Inventory, Cost, Deterministic Models, Introduction to supply chain management.

Unit-IV Quality Control: Process control, SQC, Control charts, Single, Double and Sequential Sampling, Introduction to TQM.

Laboratory

[BTEC-61P] Antenna and Microwave Lab

1. Study of Reflex Klystron Characteristics.
2. Measurement of guide wavelength and frequency of the signal in a rectangular Wave guide using slotted line carriage in a Microwave Bench.
3. Measurement of impedance of an unknown load connected at the output end of the Slotted line carriage in a Microwave Bench.
4. Determine the S-parameter of any Three port Tee.
5. Determine the S-parameter of a Magic Tee.
6. Study various parameters of Isolator.
7. Measurement of attenuation of a attenuator and isolation, insertion loss, cross coupling of a circulator.
8. Determine coupling coefficient, Insertion loss, Directivity and Isolation coefficient of an ty Multi-Hole directional coupler.
9. To study working of MIC Components like Microstrip Line, Filter, Directional Coupler, Wilkinson Power Divider, Ring resonator & coupler, antennas & amplifies.
10. Study of wave guide horn and its radiation pattern and determination of the beam width.
11. Study radiation pattern of any two types of linear antenna.

[BTEC-62P]COMMUNICATION LAB–II

1. To construct a triangular wave with the help of Fundamental Frequency and its Harmonic component.
2. To construct a Square wave with the help of Fundamental Frequency and its Harmonic component.
3. Study of Pulse code modulation (PCM) and its demodulation using Bread Board.
4. Study of delta modulation and demodulation and observe effect of slope overload.
5. Study of pulse data coding techniques for NRZ formats.
6. Study of Data decoding techniques for NRZ formats.
7. Study of Manchester coding and Decoding.
8. Study of Amplitude shift keying modulator and demodulator.
9. Study of Frequency shift keying modulator and demodulator.
10. Study of Phase shift keying modulator and demodulator
11. Study of single bit error detection and correction using Hamming code.
12. Measuring the input impedance and Attenuation of a given Transmission Line

[BTEC-65P] CAD OF ELECTRONICS LAB

P SPICE Experiments

1. (a) Transient Analysis of BJT inverter using step input.
   (b) DC Analysis (VTC) of BJT inverter with and without parameters.
2. (a) Transient Analysis of NMOS inverter using step input.
   (b) Transient Analysis of NMOS inverter using pulse input.
   (c) DC Analysis (VTC) of NMOS inverter with and without parameters.
3. (a) Analysis of CMOS inverter using step input.
   (b) Transient Analysis of CMOS inverter using step input with parameters.
   (c) Transient Analysis of CMOS inverter using pulse input.
   (d) Transient Analysis of CMOS inverter using pulse input with parameters.
   (e)DC Analysis (VTC) of CMOS inverter with and without parameters.

4. Transient & DC Analysis of NOR Gate inverter.
5. Transient & DC Analysis of NAND Gate.
6. VHDL Experiments
    a. Synthesis and simulation of Full Adder.
    b. Synthesis and simulation of Full Subtractor.
    c. Synthesis and Simulation of 3X8 Decoder.
    d. Synthesis and Simulation of 8X1 Multiplexer.
    e. Synthesis and Simulation of 9 bit odd parity generator.
    f. Synthesis and Simulation of Flip Flop (D, and T)

SEMESTER - VII

[BTEC-71] OPTICAL COMMUNICATION		3 1 0
Unit	Topics	Lectures
I	Overview of optical fiber communication: The general system, Advantages of optical fiber communication. Optical spectral band. Optical Fiber waveguides: Introduction, Ray theory transmission Total internal reflection, acceptance angle, numerical aperture, skew rays. Electromagnetic mode theory for optical propagation: Electromagnetic waves, modes in a planar guide, phase and group velocity, phase shift with total internal reflection and the evanescent field, goos hanchen shift.	10
II	Cylindrical Fiber: modes, mode coupling, step index fibers Graded index fibers, Single mode Fibre: Cut-off wavelength, Mode field diameter and spot size, effective refractive index, Group delay and mode delay factor, The Gaussian approximation, equivalent step index methods. Signal distortion in optical fibers - Attenuation, Material Absorption, losses in silica glass fibers; Intrinsic absorption, Extrinsic absorption. Linear scattering losses; Ray light scattering, Mie scattering. Non linear Scattering losses: fiber bending losses; Dispersion, Chromatic dispersion: material dispersion, waveguide dispersion. Intermodal dispersion: Multimode step index fiber, Multimode graded index fiber. Overall fiber dispersion Multimode fiber, Dispersion modified single mode fibers ,Dispersion–shifted fiber, dispersion flatted fibers, nonzero-dispersion-shifted fibers (MZ-DSF), Polarization: Fiber birefringence, polarization mode dispersion, polarization-maintaining fibers, Non linear effects: Scattering effects, Kerr effects.	10
III	Optical sources - Light Emitting Diodes (LEDs): Structures, light source materials, Quantum Efficiency on LED Power Modulation of a LED, Laser Diodes- models and threshold conditions, laser diode rate equations, External quantum efficiency, resonant frequency, laser diode structures and radiation patterns, single mode lasers modulation of laser diodes, laser lines.	6
IV	Source to fiber power launching, Source Output patterns, Power coupling calculation, Power launching versus wavelength, equilibrium numerical aperture. Photo detectors: Physical principles of photodiodes: The PIN photo detector, Avalanche photodiodes.	6

	Photo detector Noise: Noise sources, signal to noise ration. Detector Response time: Depletion layer photocurrent, response time structure of in GaAs APDs, Temperature effect on Avalanche gain, comparison of photo detectors.	
V	Optical receiver operation: Fundamental receiver operation: Digital signal transmission, error sources, front end amplifier. Digital receiver performance: Probability of error receiver sensitivity, The Quantum Unit. Eye Diagram: Eye Pattern Features, BER and Q Factor Measurement Coherent Detection: Fundamental concepts, Homodyne detection, heterodyne detection, IBER comparisons. Digital links: Point to point links, power penalties.	8

Text Book:

1. John M. Senior, "Optical Fiber Communications", PEARSON, 3rd Edition, 2010.
2. Gerd Keiser, "Optical Fiber Communications", TMH, 4th Edition, 2008.

Reference Books:

1. Govind P. Agrawal, "Fiber Optic Communication Systems", John Wiley, 3rd Edition, 2004.
2. Joseph C. Plais, "Fiber Optic Communication", Pearson Education, 4th Ed, 2004.

[BTEC-72] DATA COMMUNICATION NETWORKS		3 1 0
Unit	Topics	Lectures
I	Communication problem and system models, components of communication systems, communication channels and their characteristics, mathematical models for communication channels, multiple access techniques, link budget analysis	8
II	Representation of deterministic and stochastic signals, random noise characterization in communication systems, signal-to-noise ratio, characterization of communication signals and systems: signal space representations, representation of analog and digitally modulated signals, spectral characteristics of modulated signals	8
III	Optimal receivers: Receivers for signals corrupted by AWGN, Error performance Analysis of receivers for memory-less modulation, optimal receivers for modulation methods with memory, OFDM, MIMO, Source Coding, Channel Coding (Hamming codes)	8
IV	Error Control, Flow Control, Sliding Window Protocols, HDLC, PPP, Local area networks: Ethernet, Fast Ethernet, Token Ring, Introduction to Gigabit Ethernet and Wireless LANs; Hubs, bridges and switches	8
V	**MAC Layer** Static Channel Allocation in LANs and MANs, Dynamic Channel Allocation in LANs and MANs, ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited-Contention Protocols, Wavelength Division Multiple Access Protocols, Wireless LAN Protocols, IEEE Standard 802.3	8

Text Books:

1. Madhow, U., (2008), Fundamentals of Digital Communication, Cambridge University Press
2. Lathi, B. P. & Ding, Z., (2010), Modern Digital and Analog Communication Systems, Oxford University Press
3. Stallings, W., (2010), Data and Computer Communications, Pearson.
4. Andrew S. Tanenbaum, "Computer Networks" Pearson.
5. Ajit Pal, "Data Communication and Computer Networks", PHI
6. Dimitri Bertsekas, Robert G. Gallager, "Data Networks", Prentice Hall, 1992

[BTEC-73] VLSI DESIGN		3 1 0
Unit	Topic	Lectures
I	Introduction: A Brief History, Preview, MOS Transistors, CMOS Logic, CMOS Fabrication and Layout, Design Partitioning, Logic Design, Circuit Design, Physical Design, Design Verification, Fabrication, Packaging and Testing.	8
II	Delay: Introduction, Transient Response, RC delay model, Linear Delay	8
	Model, Logical Effort of Paths, Timing Analysis Delay Models. Power: Introduction, Dynamic Power, Static Power	
III	Energy – Delay Optimization, Low Power Architectures. Interconnect: Introduction, Interconnect Modelling, Interconnect Impact, Interconnect Engineering, Logical Effort with Wires	8
IV	Dynamic logic circuits: Introduction, basic principle of pass transistor circuits, synchronous dynamic circuit techniques, dynamic CMOS circuit techniques, domino CMOS logic. Semiconductor memories: Introduction, DRAM, SRAM, ROM, flash memory.	8
V	Low – Power CMOS Logic Circuits: Introduction, Overview of Power Consumption, Low – Power Design through voltage scaling, Estimation and Optimization of switching activity, Reduction of Switched Capacitance and Adiabatic Logic Circuits. Design for Testability: Introduction, Fault Types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based and BIST Techniques	8

Text Book:

1. Neil H.E.Weste, David Money Harris, "CMOS VLSI Design – A circuits and Systems Perspective" Pearson, 4th Edition
2. Sung-Mo Kang & Yosuf Leblebici, "CMOS Digital Integrated Circuits: Analysis & Design", TMH, 3rd Edition.

Reference Books:

1. D. A. Pucknell and K. Eshraghian, "Basic VLSI Design: Systems and Circuits", PHI, 3rd Ed., 1994.
2. W.Wolf, Modern VLSI Design: System on Chip, Third Edition, Pearson, 2002.

[BTEC-74] INFORMATION THEORY & CODING		3 1 0
Unit	Topic	Lectures
I	**Entropy**: Entropy, Joint Entropy and Conditional Entropy, Relative Entropy and Mutual Information, Relationship Between Entropy and Mutual Information, Chain Rules for Entropy, Relative Entropy, and Mutual Information, Jensen's Inequality and Its Consequences, Log Sum Inequality and Its Applications, Data-Processing Inequality, Sufficient Statistics, Fano's Inequality	8
II	**Asymptotic Equipartition Property:** Asymptotic Equipartition Property Theorem, **Consequences of the AEP:** Data Compression, High-Probability Sets and the Typical Set Data Compression: Examples of Codes, Kraft Inequality, Optimal Codes, Bounds on the Optimal Code Length, Kraft Inequality for Uniquely Decodable Codes, Huffman Codes, Some Comments on Huffman Codes, Optimality of Huffman Codes, Shannon–Fano–Elias Coding	8
III	**Channel Capacity:** Examples of Channel Capacity, 7.2 Symmetric Channels, Properties of Channel Capacity, Preview of the Channel Coding Theorem, Definitions, Jointly Typical Sequences, Channel Coding Theorem	8
IV	**Block Codes** Digital communication channel, Introduction to block codes, Single-parity-check codes, Product codes, Repetition codes, Hamming codes, Minimum distance of block codes, Soft-decision decoding, Automatic-repeat-request schemes **Linear codes** Definition of linear codes, Generator matrices, Standard array, Parity-check matrices, Error syndromes, Error detection and correction, Shortened and extended linear codes	8
V	**Convolution codes** Encoding convolutional codes, Generator matrices for convolutional codes, Generator polynomials for convolutional codes, Graphical representation of convolutional codes, Viterbi decoder	8

Text Books:

1. Joy A. Thomas, Thomas M. Cover, "Elements of information theory", Wiley-Interscience; 2 edition (July 18, 2006)
2. S. Gravano, "Introduction to Error Control Codes" OUP Oxford (24 May 2001)
3. Robert B. Ash, "Information Theory", Dover Publications (November 1, 1990)
4. Todd k Moon, " Error Correction Coding: Mathematical Methods and Algorithms " Wiley, 2005

[BTEC-71P] Optical Communication & Networking Lab

Part - A

1. Familiarisation of different types of cables and different commands.
   a) Identify Cat5 cable , RJ 45 Connector , Crimping Tool , Wire Stripper
   b) Use Wire Stripper for Cutting wire shield and Understanding of Internal Structure of Cat 5 Cable
   c) Finding Pin No-1 on RJ 45 Connector and Inserting Wires in connector
   d) Crimping of RJ45 connector using Crimping tool
   e) Preparation of Straight cable (used for Dissimilar devices such as PC to Switch , PC to router) and Cross cables (used for similar devices such as PC to PC , Router to Router , Switch to Switch)
   f) Understand different commands like ping, treacert, ifconfig, dig etc..

2. Making a subnet and configuring router
   a) Understand the working of a router & method to access the router via console or using telnet, different types of cables used for connectivity.
   b) Different types of show commands & their purpose.
   c) Assignment of IP address and enabling layer 3 connectivity.
   d) Implement sub netting

3. Configuring web and DHCP servers
   a) Understand Internet Information Services tool and its installation.
   b) To configure web services using IIS tool.
   c) Configure DHCP

4. Configuring VLAN
   a) Understand the configuration of Vlan in a switch
   b) How to make the port of a switch as an access port & a trunk port, purpose of the Vlan in a network
   c) Different types of show commands & their purpose.

5. To implement a simple file transfer protocol (FTP) using connection oriented and connectionless sockets.

6. To develop a concurrent file server that spawns several threads, one for each client requesting a specific file.

7. To develop a simple chatting application using (i) Connection oriented and (ii) Connectionless sockets

Part – B (Any 4 Experiments):

1. To setting up fiber optic analog link.
2. Study and measurement of losses in optical fiber.
3. Study and measurement of numerical aperture of optical fiber.
4. Study and perform time division multiplexing (digital).
5. Study of framing in time division multiplexing.
6. Study of Manchester coding and decoding.
7. Study of voice coding and codec chip.
8. Study and measure characteristics of fiber optic LED’s and photo detector.

[BTEC-72P] Electronics Circuit Design Lab.

In this practical course students will carry out a design oriented project work using various analog/ digital building blocks which they have already studied in their analog electronic/ digital electronic courses such as Electronic circuits, integrated circuits and filter design. The project may include but not restricted to any of the following:

1. Universal op-amp based biquad
2. Universal OTA biquad
3. Amplitude control or stabilization applied to any sinusoidal oscillators
4. Op-amp/ OTA based function generator
5. Any application of log/antilog circuits
6. Any applications of analog multiplier/ divider
7. Any digital system design and its hardware implementation using TTL/ CMOS ICs
8. Any circuit idea (not studied in the course) using 555 Timer in conjunction with any other ICs

The above must include

1. Design the circuit.
2. Make hardware and measure various parameters.
3. Simulation in Spice of the designed circuit.
4. Comparison of measured and simulated results.

A report is to be made for evaluation.

[BTOE-71] QUALITY MANAGEMENT

UNIT-I Quality Concepts:

Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type. Control on Purchased Product Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure. Manufacturing Quality Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims.

UNIT-II Quality Management :

Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program. 3 Human Factor in quality (11) Attitude of top management, cooperation of groups, operators attitude, responsibility, causes of apparatus error and corrective methods.

UNIT-III Control Charts:

Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts. 5 Attributes of Control Chart Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts.

UNIT –IV

Defects diagnosis and prevention defect study, identification and analysis of defects, correcting

measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle.

UNIT –V
ISO-9000 and its concept of Quality Management
ISO 9000 series, Taguchi method, JIT in some details.

Text / Reference Books:
1. Lt. Gen. H. Lal, "Total Quality Management", Eastern Limited, 1990.
2. Greg Bounds, "Beyond Total Quality Management", McGraw Hill, 1994.
3. Menon, H.G, "TQM in New Product manufacturing", McGraw Hill 1992.

SEMESTER - VIII

BTEC 82] Wireless & Mobile Communication		3 1 0
Unit	Topic	Lectures
I	Evolution of mobile radio communication fundamentals. General Model of	8

	Wireless Communication Link, Types of Signals, Cellular Infrastructure, Cellular System Components, Antennas for Cellular Systems, Operation of Cellular Systems, Channel Assignment, Frequency reuse, Channel Assignment strategies, Handoff Strategies Cellular Interferences, Sectorization; Wireless Channel and Radio Communication, Free Space Propagation Model, Channel Noise and Losses, Fading in Land Mobile Systems, Multipath Fading, Fading Effects on Signal and Frequency, Shadowing; Wireless Channel Modeling: AWGN Channel, Rayleigh Channel, Rician Fading Channel, Nakagami Fading Channel, Ocumura and Hata Path Loss Model; Channel Modelling: Stochastic, Flat Fading, Wideband Time-Dispersive Channel Modelling.	
II	Theory of Vocoders, Types of Vocoders; Spread Spectrum Modulation, Pseudo-Noise Codes with Properties and Code Generation Mechanisms, DSSS and FHSS Systems, Time Hopping and Hybrid Spread Systems; Multicarrier Modulation Techniques, Zero Inter Symbol Interference Communication Techniques, Detection Strategies, Diversity Combining Techniques: Selection Combining, Threshold Combining, Equal Gain Combining, Maximum Ratio Combining; Spatial Diversity and Multiplexing in MIMO Systems, Channel Estimation,	8
III	Equalization Techniques: Transversal Filters, Adaptive Equalizers, Zero Forcing Equalizers, Decision Feedback Equalizers, and related algorithms; Multiplexing and Multiple Access: FDMA, TDMA, CDMA, OFDMA, SC-FDMA, IDMA Schemes and Hybrid Method of Multiple Access Schemes, RAKE Receiver; Multiple Access for Radio Packet Systems: Pure ALOHA, Slotted ALOHA, CSMA and their versions; Packet and Pooling Reservation Based Multiple Access Schemes.	8
IV	GSM system for mobile Telecommunication, General Packet Radio Service, Edge Technology; CDMA Based Standards: IS 95 to CDMA 2000, Wireless Local Loop, IMT 2000 and UMTS, Long Term Evolution (LTE), Mobile Satellite Communication.	8
V	Introduction to Mobile Adhoc Networks, Bluetooth, Wi-Fi Standards, WiMax Standards, Li-Fi Communication, Ultra-Wideband Communication, Mobile data networks, Wireless Standards IMT 2000, Introduction to 4G and concept of NGN.	8

Text Book:

1. T.S. Rappaport, “Wireless Communication-Principles and practice”, Pearson Publications, Second Edition.
2. Upena Dalal, “Wireless Communication and Networks”, Oxford Press Publications.
3. T L Singal ,“Wireless Communications ”, McGraw Hill Publications.

Reference Books:

1. Andrea Goldsmith, “Wireless Communications”, Cambridge University Press.
2. S. Haykin & M. Moher, “Modern wireless communication”, Pearson, 2005.

[BTEC 83] OPTICAL NETWORK		3 1 0
Unit	Topic	Lectures
I	Introduction to Optical Network:- Optical Networks: multiplexing techniques, second generation optical networks. The optical layer, optical packet switching. Transmission Basics: wavelength, frequencies and channel spacing, wavelength standards. Non linear Effects: Effective length and area, stimulated brillouin scattering, stimulated raman scattering, Propagation in a non linear medium, self phase modulation, cross phase modulation Four wave mixing.	8
II	Components:-Couplers: Principles of operation, Conservation of energy, Isolators and circulators: Principles of operation Multiplexers and filters: Gratings, diffraction pattern, Bragg grating, Fiber gratings, Fabry-perot filters, multilayers dielectric thin – film filters, Mach-Zehnder interferometers, Arrayed waveguide grating, Acousto-optic tunable filter, High channel count multiplexer Architecture. Switching : large optical switches, Optical switch Technologies, large electronic switches wavelength converters: Optoelectronic Approch , optical grating, interferometric techniques wave mixing. Crosstalk: Intra-channel crosstalk, inter-channel crosstalk, crosstalk in Networks, Bidirectional system crosstalk reduction.	8
III	Networks- SONET/SDH: Multiplexing, SONET/SDH layers, SONET Frame structure, SONET/SDH physical layer, Elements of a SONET/SDH infrastructure. ATM: Function of ATM, Adaptation layers, Quality of service. IP: Routing and forwarding, QOS, WDM Network elements: Optical line terminals, Optical line amplifiers,. Optical add/Drop multiplexers: Architecture, reconfigurable OADMS, Optical cross connects: All optical OXC configuration.	8
IV	WDM Network Design Cost Trade-offs, Light path Topology Design, and Routing and wavelength assignment problems, Dimensioning Wavelength Routing Networks, Network Survivability, Basic Concepts, Protection in SONET/SDH, Protection in client layer, Optical Layer Protection, Different Schemes, Interworking between Layers, Access Networks, Network Architecture Overview, Enhanced HFC, FTTC, PON evolution	8
V	Optical Switching, OTDM, Synchronization, Header Processing, Buffering, Burst Switching, Deployment Considerations- SONET/SDH core Network	8

Text Books:

1. R. Ramaswami, & K. N. Sivarajan, "Optical Networks a Practical perspective", Morgan Kaufmann Publishers, 3rd Ed.
2. U. Black, "Optical Networks: Third Generation Transport Systems"/ Pearson Educations

Reference Books:

1. Biswanath Mukherjee "Optical WDM Networks" Springer Pub 2006.

[BTEC81] DIGITAL SYSTEM DESIGN USING VHDL		3 1 0
Unit	Topic	Lectures
I	Introduction to VHDL, reserve words, structures, modeling, objects, data type and operators, sequential statements and processes, sequential modeling and attributes, conditional assignment, concatenation and case, array loops and assert statements, subprograms.	8
II	Digital System Design Automation– Abstraction Levels, System level design flow, RTL design flow, VHDL. RTL Design with VHDL – Basic structures of VHDL, Combinational circuits, Sequential circuits, Writing Test benches, Synthesis issues, VHDL Essential Terminologies VHDL Constructs for Structures and Hierarchy Descriptions – Basic Components, Component Instantiations, Iterative networks, Binding Alternatives, Association methods, generic Parameters, Design Configuration	8
III	Concurrent Constructs for RT level Descriptions – Concurrent Signal Assignments, Guarded signal assignment Sequential Constructs for RT level Descriptions – Process Statement, Sequential WAIT statement, VHDL Subprograms, VHDL library Structure, Packaging Utilities and Components, Sequential Statements. VHDL language Utilities -Type Declarations and Usage, VHDL Operators, Operator and Subprogram overloading, Other TYPES and TYPE – related issues, Predefined Attributes	8
IV	VHDL Signal Model – Characterizing hardware languages, Signal Assignments, Concurrent and Sequential Assignments, Multiple Concurrent Drivers Standard Resolution.	8
V	Hardware Cores and Models - Synthesis rules and styles, Memory and Queue Structures, Arithmetic Cores, Components with Separate Control and Data parts. Core Design Test and Testability - Issues Related to Design Test, Simple Test benches.	8

Text Books:

1. Z. Navabi, "VHDL-Modular Design and Synthesis of cores and Systems", TMH – 3rd Edition.
2. R.D.M. Hunter, T. T. Johnson, "Introduction to VHDL" Spriger Publication, 2010.
3. J Bhasker , "VHDL Primer" –Pearson Education.

Reference Books:

3. C. H. Roth, "Digital System Design using VHDL", PWS Publishing 4. Douglas Perry, "VHDL- Programming by examples", MG

[BTOE-81]NON-CONVENTIONAL ENERGY RESOURCES

UNIT-I Introduction various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.
Solar Cells: Theory of solar cells. Solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT-II Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.
Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations.
Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT-IV Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations.
Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics, Performance and limitations of energy conversion systems.

UNIT-V Bio-mass: Availability of bio-mass and its conversion theory.
Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations.
Wave and Tidal Wave: Principle of working, performance and limitations, Waste Recycling Plants.

Text/References Books:
1. Raja etal, “Introduction to Non-Conventional Energy Resources” Scitech Publications.
2. John Twideu and Tony Weir, “Renewal Energy Resources” BSP Publications, 2006.
3. M.V.R. Koteswara Rao, “ Energy Resources: Conventional & Non-Conventional “ BSP Publications,2006.
4. D.S. Chauhan,”Non-conventional Energy Resources” New Age International.
5. C.S. Solanki, “Renewal Energy Technologies: A Practical Guide for Beginners” PHI Learning.