INSTITUTE OF TECHNOLOGY
GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR
SCHEME OF B.Tech. III[rd] SEMESTER
ELECTRONICS & COMMUNICATION ENGINEERING

III[rd] SEMESTER

S. No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	ECETh 2101	Signals & System	3	1		40	60	100	4
2.	ECETh 2102	Electronic Devices	3	1		40	60	100	4
3.	ECETh 2103	Mathematics – III	3	1		40	60	100	4
4.	ECETh 2104	Network Theory	3	1		40	60	100	4
5.	ECETh 2105	Digital Logic Circuits	3	1		40	60	100	4
6.	ECEPr 2101	Signals & System Lab	-	-	3	30	20	50	2
7.	ECEPr 2102	Electronic Devices - Lab	-	-	3	30	20	50	2
8.	ECEPr 2103	Digital Logic Circuits Lab	-	-	3	30	20	50	2
			15	**5**	**9**	**290**	**360**	**650**	**26**

L: Lecture, T: Tutorial, P: Practical, IA: Internal Assessment, MSE: Mid Semester Exam, ESE: End Semester Exam

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2101	3	1		3 hours	40	60	4

SIGNALS & SYSTEM

UNIT – I

Signals & Systems: Classification of Signals, Classification of systems, Properties of systems - Invertibility, Causality, Stability, Time Invariance, Linearity; Time domain Analysis of Discrete time and Continuous time System – Natural and Forced Response, Impulse Response and Convolution, Properties of Convolution, Step Response, Systems described by difference and differential equations, Eigen values and Eigen functions.

UNIT – II

Analysis of Continuous time Signals: Fourier analysis of Continuous time LTI system, Fourier series Representation of Periodic signals: CTFS, Representation of Aperiodic Signals: CTFT, CTFT of Periodic Signals, Properties of CTFT, System Analysis with Fourier Transform.

Analysis of Discrete time Signals: Frequency Response of Discrete time LTI system, Representation of Periodic signals: DTFS, Representation of Aperiodic Signals: DTFT, DTFT of Periodic Signals, Properties of DTFT, Frequency response of discrete time LTI systems.

UNIT – III

Review of Laplace transform: Laplace transforms, Laplace transforms of common signals, Properties of Laplace transforms, inverse Laplace transforms, Analysis of continuous time systems using Laplace Transform.

Z-Transform: Z-transforms of common sequences, Properties of Z-transforms, Region of Convergence, Inverse Z-transforms, Analysis of discrete time systems using Z-transforms.

Relation between Z and Laplace Transform, Relation between Z-Transform and DTFT.

Distortionless Transmission through a System, Linear Phase System, Ideal filters, Signal and System Bandwidth, Hilbert transform.

UNIT – IV

DFT & Fast Fourier Transform: Introduction to DFT, Properties of DFT, Circular Convolution, Introduction to FFT, Decimation in Time Algorithm, Decimation in Frequency Algorithm, Difference & similarities between DIT & DIF Algorithm, IDFT using FFT Algorithm.

UNIT – V

State space Analysis: Block diagram presentation of LTI Systems, System Realization of Continuous and Discrete time systems, State Space analysis of continuous time LTI systems, solutions of state equation for continuous time LTI systems, State Space analysis of discrete time LTI systems, solutions of state equation for discrete time LTI systems.

SUGGESTED BOOKS & REFERENCE:-

1. *Signal & System, A V Oppenheim, PHI*
2. *Signal & System, P Ramesh Babu, Scitech Publication*
3. *Signal & System, F Hussain, Umesh Publication*
4. *Discrete Time Signal Processing, A V Oppenheim, Pearson Education*
5. *Signals and Systems, by Simon Haykin and Barry Van Veen. Wiley, 1999.*
6. *Schaum's Outline of Signals and Systems – H Hsu, TMH.*
7. *Signal & System, Samarjit Ghosh, TMH.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2102	3	1		3 hours	40	60	4

ELECTRONIC DEVICES

UNIT – I

Review of Semiconductor concept: Metals,Insulators and Semiconductors, Electrical properties of Ge and Si, Conductivity Equation, Mobility and Conductivity, Electron and holes in intrinsic and extrinsic semiconductors, Donor and Acceptor Impurities,

Details: Transport Phenomena of semiconductor, Charge density in Semiconductor, Hall Effect, Injected minority charge carriers, Potential variation within graded semiconductor.

Junction Diode Characteristics: Properties of P-N junction, Open circuited P-N junction, V-I characteristics, Temperature dependence of V-I characteristics, Diode resistance, Current component of PN diode**:** Space charge capacitance, Charge control description of a diode, Diffusion capacitance, Junction diode switching times, Piecewise linear model, Breakdown mechanism.

UNIT – II

Diode Circuits: Load line concepts, Graphical analysis, Clipper circuit, Clamper, Comparator, , Rectifier, Full wave circuits, Filter circuits: Inductor filter, Capacitor filter, LC filter, Multiple LC filter, CLC or π filter. ,Zener diode regulator circuit.

OTHER DIODES: Negative conductance in semiconductors- Tunnel diode, Photo diode - Photo voltaic effect, Solar cells, Shottky Diode, Varactor Diode, Avalanche diode, PIN diode, LED, LASER.

UNIT – III

Transistor Characteristics: Junction Transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Transistor circuit configuration (CB, CE, CC)- Analytical Expression for transistor characteristics and Operation, Early Effect, Ebers-Moll Model, β-re model, Transistor as a switch.

Transistor Biasing and Thermal Stabilization: The operating point, Bias stability, Stability factor-Stabilization against variationin I_{CO}, V_{BE} and β, Emitter bias, Collector – to – base bias, Voltage divider bias with emitter bias, Emitter bypass capacitor. Bias compensation.

UNIT – IV

Field Effect Transistor (FET): JFET Construction, Operation, V-I characteristics, Transfer characteristics, Drain characteristics. Metal Oxide Semiconductor Field Effect Transistor (MOSFET)-Construction, Operation and characteristics, Depletion MOSFET, Enhancement MOSFET, complementary MOSFET, Application of CMOS.

UNIT – V

Special semiconductor Devices:, Bi-CMOS device, MIS diode heterojunction devics, Silicon controlled rectifier, V-I characteristics, gate triggering characteristics, Application, Silicon-controlled switch. DIAC, TRIAC, Unijunction transistors - Construction, Operation, V-I characteristics, Triggering circuit, Control, Application.

SUGGESTED BOOKS & REFERENCE:-

1. *Integrated Electronics: Analog & Digital Circuit Systems- Jacob Millman & Halkias, TMH*
2. *Electronic Devices & Circuits- Allen Mottershead, PHI*
3. *Electronic Devices & Circuit Theory- Boylestad & Nashelsky, PHI*
4. *Microelectronics – Millman and Grabel, TMH*
5. *Microelectronics circuits-Sedra/Smith,Oxford University Press*
6. *Electronic Devices & Circuit Analysis- K Lal Kishore, BS Publicatons*
7. *Art of Electronics , Cambridge University Press*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2103	3	1		3 hours	40	60	4

MATHEMATICS - III

UNIT – I

Functions of Complex Variables: Limit, Derivative, Analytic function, Cauchy-Riemann Equations, Harmonic Functions, Geometrical representation, Transformation, Bilinear Transformation, Application to Flow problems, Complex Integration, Cauchy´s integral theorem, and Integral formula, Taylor´s & Laurent´s series, Singular point, Poles & resides, Residue theorem & its application to contour integration.

UNIT – II

Fourier Series: Periodic Functions, Definition of Fourier series, Euler´s formulae, Dirichlet conditions, Change of interval, Even and Odd Functions, Half Range Fourier Sine & Cosine series, Parseval´s identity, Practical Harmonic Analysis.

UNIT – III

Laplace Transform: Definition, Linearity, Shifting & Scaling properties, Transform of Elementary functions, Transform of Derivatives & Integrals, Multiplication by t &division by t, Inverse Laplace transform, Convolution theorem, Transform of Periodic functions, Unit Step function & Dirac delta function, Initial value and Final value theorems, Application to solution of ordinary differential equations.

UNIT – IV

Fourier Transform: Definition of Fourier Integrals- Fourier Sine & Cosine integrals, Complex form of Fourier integral, Fourier Sine & Cosine transforms, Complex form of Fourier Transform, Linearity, Shifting & Scaling properties, Modulation theorem, Inverse Fourier transform, Fourier transform of derivatives.

UNIT – V

Theory of Probability: Mathematical and Statistical definition of Probability, Addition Law of Probability, Multiplication Law of Probability, Conditional Probability, Bayes Theorem, Binomial Distribution, Poisson Distribution, Normal Distribution.

SUGGESTED BOOKS & REFERENCE:-

1. *H K Das, "Advance Engg. Mathematics", S-Chand Publication*
2. *B S Grewal, "Higher Engg. Mathematics", Khanna Publication*
3. *Erwin Kreyszig, "Advance Engg. Mathematics", J Willey & Sons*
4. *Louis A Pipes, "Applied Mathematics for Engineers & Physicists", TMH*
5. *R M Rao & A S Bopardikar, "Wavelet Transforms- Introduction to Theory and ApplicationsAdvance Engg. Mathematics"*
6. *Burrus Sidney, R A Gopinath, Guo Haitao, "Introduction to Wavelets and Wavelet Transforms", Printice Hall International.*
7. *Y T Chan, "Wavelet Basics", Kluwer Academic Publishers*
8. *Lokenath Debnath, "Wavelet Transforms and their applications"*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2104	3	1		3 hours	40	60	4

NETWORK THEORY

UNIT – I

Review of Circuit concept: R, L C parameter, Relationship of field & circuit concepts, KVL & KCL, Duality, Dot Convention to Coupled circuits.

Network Graph Theory: Introduction, Concept of Network Graph, Terminology Used in Network Graph, Properties of Tree in a Graph, Formation of Incidence Matrix, Properties of Incidence Matrix, Number of Tree in a Graph, Cut Set Matrix, Loop Matrix, Interrelation among various Matrices.

Sinusoidal steady state analysis of R, C L circuits, Excitation and Resonance.

First order differential equations: General & Particular solutions, time constants, Integration factor, Initial factor, Initial conditions in Networks: Why Study Initial Conditions, Initial Conditions In Element, Geometrical Interpretation Of Derivatives, A Procedure for Evaluating Initial Conditions, initial State of a Network.

UNIT – II

Second order differential equations: Internal Excitation, Network excited by external energy sources, Responses as related to the s-plane location of roots, General solutions in terms of S, Q and Wn.

Laplace transformation: Laplace transform of some important functions, Shifting theorem, The initial & final value of f(t) & F(S), Convolution Integral, Convolution as a summation.

UNIT – III

Impedance Function: Complex frequency, Transform impedance and transform circuits; Impulse, Unit Step, Ramp and Gate function; Waveform synthesis.

Network Theorem: Thevenin´s & Norton´s theorem, Superposition, Reciprocity, Maximum Power transfer and Millman´s theorem, Telligen´s theorem.

UNIT – IV

Poles and Zeros of Network function: Restrictions on poles & zeros, Locations for transfer function & driving point functions, Time domain behavior from pole and zero plot, Stability of active network.

Two port parameters: Relation of two port variables, Short circuit admittance parameter, Open circuit Impedance parameter, Transmission parameters, h-parameter, T-parameter, Relation between parameter sets, parallel connection of two Port network.

UNIT – V

Network Synthesis: Concept, Hurwitz property positive realness properties of positive real functions, Synthesis of RL, RC and LC, Driving point impedance functions using simple canonical Networks-Foster and Causer form.

SUGGESTED BOOKS & REFERENCES:

1. *M E Valkenbarg, "Network Analysis", PHI/Pearson Edu*
2. *Engineering circuit analysis-Hayt and Kimberley, TMH*
3. *A Chakraborty, "Circuit Theory Analysis & Synthesis", Dhanpat Rai & Co.*
4. *Network Theory- D. Roy Chaudhary, Newage Asian*
5. *Electric Circuit Analysis-Alexender and Sadique, TMH*
6. *Engineering circuit analysis-Hayt and Kimberley, TMH*
7. *A Sudhakar & Shyam Mohan S Palli, "Cirucits and Networks:Analysis & Synthesis", TMH*
8. *Samarjit Ghosh, "Network Theory Analysis & Synthesis", PHI*
9. *T Lapatra, "Network Synthesis", TMH*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2105	3	1		3 hours	40	60	4

DIGITAL LOGIC CIRCUITS

UNIT – I

CODES: Binary codes: Introduction & usefulness, Weighted & non-weighted codes, Sequential codes, Self complementing codes, Cyclic codes, 8-4-2-1 BCD code, Excess-3 code, Grey code: Binary to Grey and Grey to Binary code conversion, Error detecting code, Error correcting code, 7-bit Hamming code, ASCII code, EBCDIC code.

Realization of Boolean Expressions: Reduction of Boolean Expressions using Laws, Theorems and Axioms of Boolean Algebra, Boolean expressions and logic diagram, Converting AND/OR/Invert logic to NAND/NOR logic, SOP and POS Forms and their Realization.

UNIT – II

Minimization Techniques: Expansion of a Boolean expression to SOP form, Expansion of a Boolean expression to POS form, 2,3 & 4 variable K-map: Mapping and minimization of SOP and POS expressions. Completely and Incompletely Specified function-Concept of Don´t Care Terms.

UNIT – III

Combinational Circuits: Adder & Subtractor: Half adder, Full adder, Half subtractor, Full subtractor, Parallel binary adder, Look Ahead carry adder, Serial adder, BCD adder, Code converter, Parity bit generator/checker, Comparator. Decoder: 3-line to 8-line decoder, 8-4-2-1 BCD to Decimal decoder, BCD to 7 segment decoder. Encoder: Octal to Binary and Decimal to BCD encoder. Multiplexer: 2-input multiplexer, 4-input multiplexer, 16-input multiplexer. Demultiplexer: 1-line to 4-line & 1-line to 8-line demultiplexer, Multiplexer as Universal Logic Function Generator, Programmed Array Logic (PAL), PLA and PLD.

UNIT – IV

Sequential Circuits: Flip-Flop & Timing Circuits: S-R Latch, Gated S-R Latch, D Latch, J-K Flip-Flop, T Flip-Flop, Edge-triggered S-R, D, J-K, T Flip-Flops, Master-Slave Flip-Flop, Direct Preset and Clear Inputs, Shift Registers: PIPO, SIPO, PISO, SISO, Bi-directional Shift Registers, Universal Shift Registers, Counter: Asynchronous Counter: Ripple Counter, Design of Asynchronous Counter, Effect of propagation delay in Ripple Counter, Synchronous Counter: 4-bit Synchronous Up Counter, 4-bit Synchronous Down Counter, Design of Synchronous Counter, Ring Counter, Jhonson Counter, Pulse Train generators using Counter, Design of Sequence generator: Digital clock using counters.

UNIT – V

Digital Logic Families: Introduction, Simple Diode Gating and Transistor Inverter, Basic concepts of RTL and DTL, TTL, Open collector gates, TTL subfamilies, IIL, ECL, MOS Logic, CMOS Logic, Dynamic MOS Logic, Interfacing: TTL to CMOS, CMOS to TTL, Comparison among various logic families, Manufacturer´s specification.

SUGGESTED BOOKS & REFERENCES:

1. *A Anand Kumar, "Fundamentals of Digital Circuits", PHI*
2. *H Taub and D Schilling, "Digital Integrated Electronics", TMH*
3. *Digital Logic and Computer Design, Morris Mano, PHI*
4. *An Engineering Approach to Digital Design, W. Fletcher, PHI Edition*
5. *Floyed & Jain, "Digital Fundamentals", Pearson Edu*
6. *A P Malvino, "Digital Electronics" TMH*
7. *A Lee, "Digital Circuits & Logic Design", PHI*
8. *Fundamentals of Digital Logic with Verilog Design, S. Brown and Z. Vranesic, TMH*
9. *Digital System Design using VHDL, C. H. Roth, Thompson Publications*

INSTITUTE OF TECHNOLOGY
GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR
SCHEME OF B.Tech. III[rd] SEMESTER
ELECTRONICS & COMMUNICATION ENGINEERING

IV[th] SEMESTER

S. No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	ECETh 2201	Numerical Analysis	3	1		40	60	100	4
2.	ECETh 2202	Analog Circuits	3	1		40	60	100	4
3.	ECETh 2203	Electronic Measurement & Instrumentation	3	1		40	60	100	4
4.	ECETh 2204	Communication System-I	3	1		40	60	100	4
5.	ECETh 2205	Data Structure & Operating System	3	1		40	60	100	4
6.	ECEPr 2201	Analog Circuits Lab			3	30	20	50	2
7.	ECEPr 2202	Electronic Measurement & Instrumentation Lab			3	30	20	50	2
8.	ECEPr 2203	Data Structure Lab			3	30	20	50	2
			15	**5**	**9**	**290**	**360**	**650**	**26**

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2201	3	1		3 hours	40	60	4

NUMERICAL ANALYSIS

UNIT – I

Approximations and Errors in Computations: Errors and their analysis, Types of Errors, General Error-formula, Errors in numerical computation.

Curve Fitting: Methods of Least squares, Fitting of a straight line, Fititng of an exponential curves, Polynomial Fit, Non linear Regression (2nd degree parabola), Least squares Approximation, Method of moments.

UNIT – II

Numerical Solution of Algebraic and Transcendental Equations: Graphical Method, Bisection Method, Secant Method, Regulfalsi Method, Newton Raphson Method, Iteration Method AITKEN´S Method, Newton rate of convergence.

Solution of a system of simultaneous linear algebraic Equations Direct method: Gauss elimination method, Gauss Jordon Method, Triangularisation Method, Crout´s Method, Choleshy Method, Ill conditioned system of equation and refinement of solution.

Iterative Methods: Jacobi Iterative Method, Gauss Siedel Iterative Method, Successive Over Relaxation (SOR) Method.

UNIT – III

The Calculus of Finite Differences: Finite differences, Difference formula, Operators and relation between operators, Differences of a polynomial factorial polynomial, Effect of an error on a difference table, Inverse operator.

Interpolation with equal intervals: Newton´s forward and backward interpolation formula.

Central difference interpolation formula: Gauss´s forward and backward interpolation formula, Sterling´s formula, Bessel´s formula, Laplace-Everett´s formula, Choice of interpolation formula.

Interpolation with Unequal intervals: Lagrange´s interpolation, Newton´s difference formula, Hermit´s interpolation, Inverse interpolation.

UNIT – IV

Numerical Differentiation and Intergration: Numerical Differentiation, Newton´s forward and backward difference interpolation formula, Maxima and Minima of a Tabulated function.

Numerical Integration: Newton-Cote´s quadrative formula, Trapezoidal rule, Simpson´s $1/3^{rd}$ rule, Boole´s rule, Weddle rule.

Difference Equations: Definition, Order and degree of a difference equation, Linear difference equation, Difference equations reducible to Linear form, Simultaneous difference equations with constant coefficients, Applications.

UNIT – V

Numerical solution of ordinary differential equation: Taylor series method, Picard´s method, Euler´s method, Modified Euler method, Runge´s method, Runge Kutta method, Predict corrector method, Milne´s method, Adam-Bashforth method.

Numerical solution for partial differential equations: Classification of P.D.E. of the 2^{nd} order Elliptic equations, Solution of Laplace equation, Solution of Poisson´s equation, Solution of elliptic equations by Relaxation method, Parabolic equations, Solution of one two dimensional heat equation, Hyperbolic equation, Solution of wave equations.

SUGGESTED BOOKS & REFERENCE:-

1. *Jain & Iyngar, Numerical Methods for Scientific and Engineering Computations.*
2. *G S Rao, Numerical Analysis.*
3. *B S Grewal, Numerical Mrthods in Engineering Science.*
4. *K K Das, Advance Engineering Methods.*
5. *V Rajaraman, Computer Oriented Numerical Methods.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2202	3	1		3 hours	40	60	4

ANALOG CIRCUITS

UNIT – I

Low Frequency Transistor Amplifier: Graphical Analysis of CE amplifier; h-parameter Models for CB, CE, CC configurations and their Interrelationship; Analysis and Comparison of the three Configurations; Linear analysis of Transistor Circuits: Miller's Theorem: Cascading: Simplified Models and Calculation of CE and CC Amplifiers; Effect of emitter Resistance in CE amplifiers: Cascade amplifiers: Darlington Pair, analysis of Single stage FET amplifier-CS and CD Configuration, FET as VVR.

UNIT – II

High Frequency Transistor Amplifier: CE hybrid pi model, Validity and parameter Variation, Current gain with Resistive load: frequency response of a single stage CE amplifier: Gain-Bandwidth product: CC stage High frequencies.

Multistage Amplifier: Classification: Distortion in Amplifiers: Frequency Response: Bode Plots, Step response, Pass band of Cascaded Stages: Response of a two-stage RC coupled Amplifier at Low and High frequencies: sources of noise in transistor circuits, Noise figure.

UNIT – III

Feedback Amplifiers: Classification: Feedback concept, Ideal feedback amplifier, Properties of negative feedback amplifier topologies: Method of Analysis of feedback amplifier, Voltage series feedback: Voltage series feedback pair: Current series, current shunt, Voltage shunt feedback, Effect of feedback on amplifier bandwidth and stability.

Oscillator: Sinusoidal oscillator, Phase shift oscillator, Wien bridge oscillator, Resonant circuit oscillators: LC Collpit, LC Hartley, Amplitude, Frequency and Phase stability Analysis of all oscillators, General form of oscillator configuration: Crystal oscillator.

UNIT – IV

Large Signal/ Power Amplifier: Classification, large signal amplifier characterstics, class A amplifiers: class A amplifier with direct-coupled resistive load , transformer-coupled class A amplifier, class A pushpull amplifiers, class B amplifiers- transformer-coupled push-pull class B amplifier, complementary symmetry push-pull class B amplifier, class AB amplifier, class C amplifier, Harmonic Distortion, Push-pull Amplifiers, Cross-over Distortion.

Tuned Amplifiers: Classification of tuned Amplifier, Analysis of single and double tuned amplifiers, Stagger tuned amplifier.

UNIT – V

Discrete and IC Manufacturing Techniques: Semiconductor materials: Si, Ge, GaAs, Brief idea on: Zone refining process, Single crystal formation: Czochralski technique, Discrete diode: Grown junction, Alloy, Diffusion, Epitaxial growth; Transistor fabrication: Alloy junction, Grown junction, Diffusion. Integrated Circuits, Monolithic Integrated Circuits, Thin Film and Thick Film Integrated Circuits, Hybrid Integrated Circuits.

SUGGESTED BOOKS & REFERENCE:-

1. *Integrated Electronics, Millman & Halkias, TMH*
2. *Microelectronics, Millman & Grabel, TMH*
3. *Electronic Device & Circuits, David A Bell, PHI*
4. *Electronic Device & Circuit Theory, Boylestad & Nashelsky, PHI*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2203	3	1		3 hours	40	60	4

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

UNIT – I

Measurements and Measurement system: Measurements, Significance of measurement, Methods of measurement- Direct and Indirect Method.

Instruments and measurement system: Mechanical, Electrical, Electronic instruments; Classification of Instruments: Deflection and null type instruments. Analog and Digital mode of Operation, Application of measurement system, Characteristics of instrument and measurement system: static & dynamic; Elements of a Generalized Measurement System: Primary Sensing Element, Variable Conversion Element, Data presentation Element.

Accuracy and precision, Significant figure, types of error, gross error, systematic error- Instrumental, Environmental, Observational Errors, Random error, Probability of error, Probable Error- of a finite number of readings, for combination of components, Limiting error.

UNIT –II

Electromechanical Indicating Instruments: Operating forces, Constructional Details, Types of Support, Torque/Weight Ratio, Control system, Damping- Air friction and Eddy current damping.

D´Arsonaval Galvanometer- construction, Torque Equation, Dynamic Behavior, Undamped, Damped, Overdamped Motion, Response of Galvanometer. Ballistic Galvanometer. PMMC- Construction, Torque Equation, Voltage/Current Measurement: Ammeter, Voltmeter, Ohmmeter, Multimeter (V.O.M.), Ratiometer, Megger.

High frequency Measurement: Q-meter

UNIT – III

AC Bridge: Introduction, Sources and Dectectors, General equation for bridge balance, General form of AC Bridge. Maxwell´s Bridge, Hay´s bridge, Anderson´s bridge, De-Sauty´s bridge, Schering bridge, Wien´s bridge.

Power Factor Meter: Power factor meter, Single phase electrodynamometer, Moving Iron power factor meter.

Frequency measurement: Frequency meter- Machanical Resonance type, Electrical Resonance type, Wetson type.

Electronic Instruments: Introduction, Advantage of Electronic voltmeter, VTVM, Differential voltmeter, Electronic voltmeter using rectifier, True RMS reading voltmeter, Calorimeter power meter.

UNIT – IV

Transducers: Classification of transducer, Primary & Secondary, Passive & Active, Analog & Digital, Potentiometer, loading effect, Strain Gauge, Thermistor, Construction of thermistor, Thermocouple, LVDT, Advantage & Disadvantage of LVDT, RVDT, Capacitive Transducer, Piezo-electric transducer, Hall-effect Transducer, Capacitive Transducer, Pressure Transducer.

UNIT – V

Display devices: Digital display method, Segmental display- 7segment & 14 segment display, dot matrix, LED, LCD, TFT, Plasma display, DLP.

Digital voltmeter (DVM): Types of DVM, Ramp type DVM, Integrating type DVM, Potentiometer type (non-integration type).

Recorders: Analog Recorder, Null type Recorder, Single point Recorder, Graphical strip chart, X-Y recorders, Magnetic tape recorder, FM recorder.

CRO: Introduction, Oscilloscope block diagram, CRT, Functional block diagram of sampling, Storage, Dual trace and dual beam oscilloscope.

SUGGESTED BOOKS & REFERENCE:-

1. *Modern Electronic Instrumentation and Measurement Technique, W D Cooper & A D Helfrick, PHI 2000*
2. *A Course in Electrical and Electronic Measurements and Instrumentation, A K Sawhney, Dhanpat Rai & Sons, 2010*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2204	3	1		3 hours	40	60	4

COMMUNICATION SYSTEM – I

UNIT – I

Random Variables & Processes: Probability, Random Variables, Cumulative Distribution Function, Probability density function, development of optimal receiver, average value & Variance of Random Variable, co relation between random variables, Random process, auto correlation and Power spectral density of random process, classification of random process.

UNIT – II

Amplitude Modulation: Review of Signal Analysis, Introduction to communication system, Frequency Translation ,A Method of Frequency Translation, Recovery of Baseband Signal, Amplitude Modulation, Maximum Allowable Modulation, The Square-Law Demodulation, Spectrum Of An AM Signal, Modulators & Balanced Modulators, Single Sideband Modulation, Method Of Generating An SSB Signal, VSB, Multiplexing, Block Diagram of AM Transmitter & super heterodyne receiver.

.

UNIT – III

Exponential Modulation: Phase & Frequency Modulation: Mathematical representation of FM & PM signals, Relationship Between Phase & Frequency Modulation, Phase & Frequency Deviation, Spectrum Of An FM Signal, Transmission BW of FM waves, Phasor Diagram For FM waves, WBFM & NBFM , Generation of FM waves: Indirect FM (Armstrong Method), Direct FM, Demodulation of FM waves, Balanced frequency discriminator – Zero-crossing detector, comparison of AM and FM systems. Block Diagram of FM Transmitter & Receiver.

UNIT – IV

Mathematical Representation of Noise: Sources of noise, Frequency domain Representation of Noise, spectral component of noise, effect of filter on PSD of noise , superposition of noise, quadrature component of noise, resistor noise, available power , noise temperature, noise figure, two port cascaded systems, noise bandwidth, effective input noise temperature, White noise.

UNIT – V

Noise in CW Modulation: AM Receiver model, Signal to noise ratios for coherent reception. DSB-SC receiver, SSC-SC receiver, Noise in AM receivers using envelope detection. AM threshold effect, FM receiver model, Noise in FM reception, Capture effect in FM, Threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

SUGGESTED BOOKS & REFERENCE:-

1. *"Principles of Communication System", Taub & Schilling, TMH*
2. *"Electronic Communication System", George Kennedy, TM*
3. *"Principles of Communication Systems", Simon Haykin, John Wiley, 2nd Ed.,.*
4. *"Communication System", R P Singh & S D Sapre , TMH*
5. *" Modern Analog and Digital Communication",B.P Lathi 3rd edition, Oxford Press*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh2205	3	1		3 hours	40	60	4

DATA STRUCTURE & OPERATING SYSTEM

UNIT – I

Data structure: Introduction, classification, operations, algorithm analysis.

Array: insertion, deletion, searching, sorting. Dynamic memory allocation.

UNIT - II

Linked List: Singly, Doubly and their operations, stacks and their concepts, Conversion of infix notation using stack, evaluation of postfix expression, recursion, Queue and their concepts.

UNIT - III

Tree: Introduction, binary tree traversal, binary search tree and their operations.

Graph: Representation of graph, shortest path, graph traversal, spanning tree, minimum spanning tree.

UNIT - IV

Operating System Overview: Operating system objectives and functions, evolution of operating system, System calls.

Process Management: Process concepts, CPU scheduling, Deadlocks, Deadlock detection, prevention and recovery.

UNIT - V

Memory Management: Swapping, Contiguous allocation, Paging, Segmentation, Virtual memory, Demand paging, Page replacement policies, Thrashing.

Disk Management: Free space management, Disk management, Disk scheduling.

SUGGESTED BOOKS & REFERENCE:-

1. *Data Structures, Seymour Lipschutz, Schaum's Series, Tata McGraw Hill Publication.*
2. *Operating System, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Tata McGraw Hill Publication.*
3. *Data Structure Using C, Aaron M. Tanenbaum, Pearson Publication.*
4. *Operating Systems, William Stallings, Pearson Education.*

INSTITUTE OF TECHNOLOGY
GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR
SCHEME OF B.Tech. III[rd] SEMESTER
ELECTRONICS & COMMUNICATION ENGINEERING

V[th] SEMESTER

S. No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	ECETh 3101	LIC & its Application	3	1		40	60	100	4
2.	ECETh 3102	Electromagnetic Field Theory	3	1		40	60	100	4
3.	ECETh 3103	Microprocessor & Its Applications	3	1		40	60	100	4
4.	ECETh 3104	Automatic Control System	3	1		40	60	100	4
5.	ECETh 3105	Communication System – II	3	1		40	60	100	4
6.	ECEPr 3101	LIC & its Application Lab			3	30	20	50	2
7.	ECEPr 3102	Microprocessors & & Its Applications Lab			3	30	20	50	2
8.	ECEPr 3103	Communication System Lab			3	30	20	50	2
			15	**5**	**9**	**290**	**360**	**650**	**26**

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3101	3	1		3 hours	40	60	4

LIC & ITS APPLICATIONS

UNIT – I

Basic Building Blocks for ICs & OPAMP: Basic Differential Amplifiers & Analysis, Introduction to OPAMP**,** Ideal OPAMP Characteristics, OPAMP ICs:741Pin Diagram and Pin Function, Inverting Amplifier, Non-Inverting Amplifier, Definition of OPAMP Parameters, Frequency Response of OPAMP, Open Loop & Closed Loop Configuration of OPAMP and its Comparisons, Voltage Comparator, Zero Crossing Detector, Level Detector.

UNIT – II

Applications of OPAMP: Introduction, Adder, Substractor/Difference Amplifier, Voltage Follower, Integrator, Differentiator, Comparator IC such as LM339, Window detector, Current to Voltage and Voltage to Current Converter, Instrumentation Amplifier, Precision Half Wave Rectifier, Precision Full Wave Rectifier, Log & antilog amplifier, Schmitt Trigger, Bridge Amplifier, Peak Detectors/Peak follower, Sample- and- Hold Amplifiers, Square wave generator, Saw-tooth wave generator, Triangular wave generator, Astable multivibrator, Monostable multivibrator, Dead Zone circuit- with positive output, with negative output, Precision clipper circuit, Generalized Impedance Converter (GIC) and its application.

Frequency response of OPAMP: Open loop voltage gain as a function of frequency, Unity gain Bandwidth, Close loop frequency response, Slew Rate.

UNIT – III

Active filters & PLL - Introduction to Filters, Merits & Demerits of active filters of over Passive Filter, Classification of filters, Response characteristics of Filter, First Order and Second Order active high pass, Low pass, Band pass and band reject Butterworth filters.

Phase Lock Loop: Operating Principle of the PLL, Linear Model of Phase Lock Loop, Lock Range and Capture Range, Application of the PLL. Voltage Controlled Oscillator(VCO).

UNIT – IV

D/A and A/D converters & Analog Multiplier: D/A converter - Ladder, R-2R, A/D converters-Ramp, Continuous conversion, Flash ADC, Dual slope ADC, Successive Approximation, Voltage to Time converters. Timing and circuits comparisons, DAC/ADC specifications.

Analog Multiplier: Basic Analog Multiplication Techniques, Applications of Multiplier- Frequency doubling, Phase-angle difference detection, Voltage dividing action, Square root of a signal, Function realization by Multiplier, Amplitude Modulator, Standard Modulator Circuit, Demodulation of AM signal.

UNIT – V

Timer & Regulators: Monolithic 555 Timer: Functional Diagram: Monostable and Astable operation using 555 Timer. Voltage Regulators: Basic Configurations Parameters for Voltage Regulators, Basic blocks of linear IC voltage regulators, Positive and negative voltage regulators, Positive and negative voltage regulators, General Purpose IC Regulator (723): Important features and Internal Structure, Switching regulators.

SUGGESTED BOOKS & REFERENCE:-

1. *"Op - Amps and Linear Integrated Circuits", Ramakant A. Gayakwad, PHI*
2. *"Operational Amplifiers and Linear Integrated Circuits", Robert. F. Coughlin & Fred.F. Driscoll, PHI/Pearson*
3. *"Linear Integrated Circuits", D. Roy Choudhury and Shail B. Jain, New Age International*
4. *" Integrated Circuits" by K. R. Botkar, Khanna Publications*
5. *"Design with Operational Amplifiers and Analog Integrated Circuits", Sergio Franco, TMH*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3102	3	1		3 hours	40	60	4

ELECTROMAGNETIC FIELD THEORY

UNIT-I

INTRODUCTION: Review of vector analysis, Scalar & vector products, Coordinate systems and Transformation amongst rectangular, cylindrical and spherical co-ordinate system, Line, Surface and Volume Integral, Gradient of a Scalar, Divergent and Curl of a vector, Divergence Theorem, Stoke´s Theorem, Laplacian of a Scalar.

UNIT-II

Electrostatics: Coulomb's law, electric field intensity from point charges, field due to continuous distribution of charges, Electric Flux density, Gauss's law, Electric displacement and displacement density, Electric Potential, Potential field of a point charge, Laplace and Poison's equation.

Magnetostatics: Biot-Savart´s law, Ampere's circuital law and its Application, Magnetic flux density, Magnetic Scalar and Vector potential, Magnetic Energy stored.

UNIT-III

Time Dependent Field: Ampere's work law in differential work form, continuity of currents, Conduction and displacement currents, Maxwell's equation and their interpretations, Boundary conditions.

Energy Flow And Poynting Vector: Pointing theorem, interpretation of ExH.Simple application, complex pointing vector.

UNIT-IV

Wave equations, Sinusoidal time varying fields, uniform plane wave in dielectric and conductor media, Skin effect and depth of penetration, Reflection and refraction of plane waves at boundaries for normal and oblique incidence surface impedence.

UNIT-V

Transmission Lines: Transmission line theory from the circuit concept, Properties, Constants, Transmission line equations, Infinite line, Reflections in Transmission lines, Voltage Current and Impedance relations- Open and short circuit lines, Experimental determination of line constants, Standing wave ratio, Impedance matching, Quarter and half wave lines, Single stub and double stub matching, Circle diagram, Smith chart.

SUGGESTED BOOKS & REFERENCE:-

1. "Elements of Electromagnetics",Matthew N.O. Sadiku, OXFORD Press
2. "Elements of Electromagnetics", Hayt and Buck, TMH
3. "Electromagnetic waves and radio system", Jorden R.F.
4. "Principle and applications of Electromagnetic fields", Ptonsey R and Collin R.P.

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3103	3	1		3 hours	40	60	4

MICROPROCESSOR & ITS APPLICATIONS

UNIT – I

Microprocessor architecture and Microcomputer systems: History And Evolution, Types Of Microprocessors, Functions of Microprocessor, Architecture of 8085, Pin configuration and Function, Tristate Bus concept, Generation of Timing Signals, Bus Timing, Demultiplexing, Instruction execution, Instruction cycle, Machine cycles, T states, Fetch executes cycle, Instruction Timing and Operation status.

UNIT – II

Memory map & addresses, I/P devices ,I/P Addressing, The 8085 Programming model, Instruction Classification, Instruction & Data Formats, Addressing Modes, Instruction for data transfer, Arithmetic and Logical operation, Branching operation, Addressing mode, Writing Assembly Language Programs.

Counters, Time Delays And interrupts: Memory interfacing, Absolute, Partial Decoding, Multiple Address Range, Interfacing memory with wait states, Interfacing I/O devices, Peripheral I/O, Memory Mapped I/O, 8085 Single Board Microcomputer System. Interfacing Of 8085 with 8155/8156(RAM), 8355/8755(ROM).

UNIT – III

Programming Techniques with additional instructions, Looping, counting and indexing, Data transfer from/to memory to/from microprocessor, 16-bit arithmetic instructions, Logic Operations like rotate, compare, Time delays, Counters, Stacks, Subroutine, Call and return instructions. Interrupts, The 8085 interrupt process, multiple interrupt and priorities, Vectored interrupts. Restart as software instruction.

UNIT – IV

Programmable Interfacing devices: Basic Concept, 8279 programmable Keyboard/Display interface,8255A Programmable Parallel interface, Interfacing keyboard and display using 8255A, 8254 Programmable Interval Timer, 8259A Programmable Interrupt Controller, Direct Memory Access(DMA), 8237 DMA Controller. Basic Concept in Serial I/O, Data Communication over Telephone Lines, 8085-serial I/O lines, 8251A Programmable Communication interface, Interfacing a matrix keyboard, Interfacing LED and seven segment displays.

UNIT –V

Introduction of 16-bit Microprocessor: Internal organization of 8086, Signal descriptions, Physical memory organization, Minimum & Maximum mode, Bus Organization and timing. Addressing modes, Instruction set, Assembler directives, Interrupts and Interrupt service routine.

SUGGESTED BOOKS & REFERENCE:-

1. *"Microprocessor Architecture, Programming & Applications with the 8085",R.S.Gaonkar, Penram Publication.*
2. *"Microprocessor System, Architecture Programming & Design", Yu-Cheng Lieu & Glenn A Gibson,*
3. *"Microprocessors & Interfacing: Programming & Hardware ",D.V.HALL, McGraw Hill*
4. *"Advance Microprocessor & Peripherals", A K Rai , K M Bhurchandi, TMH*
5. *"The Intel Microprocessor", Barray B. Brey, PHI*
6. *"The 8051 Micro Controller Architecture, Programming and Application", K J Ayala, Thomson Publishers.*
7. *"Micro Controller Theory and Application", A V Deshmukh, TMH, 2005*
8. *"The 8051 Micro Controller and Embedded System", M A Mazidi, J G Mazidi, R D McKinlay, Pearson Education, 2008.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3104	3	1		3 hours	40	60	4

AUTOMATIC CONTROL SYSTEM

UNIT-I

Control System Component & Transfer Function: Control System Component & Transfer Function: System component, open loop and closed loop system, Introduction to feedback concept, Mathematical modeling of electrical & mechanical system. Transfer function of Linear system, Block diagram and its reduction procedure, Signal flow graph, Mason gain formula, System Components, potentiometer, AC&DC servomotor.

UNIT-II

Time Response Analysis: Time response of first and second order system, Types of systems, Steady State Error and Error Constants, Basic control action and automatic controllers, effects of proportional, integral, derivative and PID controller on system performance.

UNIT-III

Stability: Concept of stability, Necessary Condition for Stability, absolute and relative stability, Hurwitz Stability Criterion, Routh Stability Criterion, Relative stability Analysis.

Root Locus Technique: Concept, Root locus techniques, Construction of Root Loci, Breakaway points, Determination of Roots from Root Locus, Root contours, Sensitivity of the Roots of the Characteristic Equation.

UNIT-IV

Frequency Domain analysis & Compensation Techniques: Correlation between time and frequency response, Polar Plots, Inverse Polar Plots, Bode Plots- details, Pole and Zero on real axis, Complex conjugate pole, Construction of Bode Plots, Compensation Network - phase lead, phase lag, lag-lead compensation, Feedback Compensation.

Stability in Frequency Domain: Nyquist stability criteria- Nyquist contour, Mapping, Nyquist criteria, Assessment of relative stability using Nyquist criteria, Gain margin and Phase margin,

UNIT-V

State Variable Analysis and Design: Concept of State, State Variables and State Model for linear continuous time systems, State space representation using Phase variables, Phase variable formulations, State space representation using Canonical variables, State Variables and discrete time system, Diagonalization, Solution of State Equations, Controllability and Observability.

SUGGESTED BOOKS & REFERENCE:-

1. *"Modern Control Engineering", Ogata, Pearson Education.*
2. *"Control System Engineering",Nagrath & Gopal, New Age International.*
3. *"Automatic Control System"B.C. Kuo, PHI*
4. *"Linear Control System",B.S.Manke, Khanna Pub.*
5. *"Modern Control System",R.C.Dorf & R.N.Bishop, AWL Low price edition.*
6. *"Introduction to Control Engineering", Ajit K.Mandal, New Age International.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3105	3	1		3 hours	40	60	4

COMMUNICATION SYSTEM – II

UNIT – I

Pulse Modulation: Sampling theorem, Basic principles of PAM, PWM and PPM, TDM, comparison of TDM with FDM; Typical multiplexed systems.

Pulse Code Modulation: Pulse code modulation, generation and detection of PCM, quantization, companding, A-Law and μ-Law, differential PCM; Delta modulation, Adaptive delta modulation, delta sigma modulation.

UNIT – II

Digital Modulation Techniques: Introduction – Pass band Transmission model- Generation, Detection of BPSK, DPSK, DEPSK, QPSK, M-Ary PSK, QASK, BFSK, MSK, Duo- Binary Encoding, QAM.

UNIT – III

Optimal reception of digital signal: Performance of Digital Modulation Systems, S/N ratio of PCM and DM, Comparison of PCM and DM. pulse shaping of baseband signal, Equalization principles, ISI, Optimum Filter, Matched Filter, Error Probability of Various digital modulation Technique.

UNIT – IV

Information Theory: The concept of Information, average information, Entropy; Marginal, Conditional and Joint Entropies, Information rate , Shannon's theorm, Channel capacity, Bandwidth S/N tradeoff, Discrete communication channels, Shannon's limit, mutual information and channel capacity, Continuous communication channels, Channel with finite memory, Discrete memory less channels.

UNIT – V

Coding: General principles of coding, necessary and sufficient condition for noiseless coding, Coding efficiency, Shannon-Fano and Huffman coding; Error control, Hamming codes, Linear block codes, Cyclic codes, Convolutional codes - Viterbi Algorithm, Trellis coded Modulation.

SUGGESTED BOOKS & REFERENCE:-

1. Principles of Communication Systems –Taub and Shilling, Tata Mc Graw Hill.
2. Communication Systems –Simon Haykins. Tata McGraw Hill
3. Principles of Digital Communication Systems, B.P. Lathi, PHI
4. A Text Book of Analog & Digital Communication – P. Chakrabarti, Dhanpat Rai & Co.
5. Principles of Digital Communications, Das, Mullick and Chatterjee, Wiley Eastern Publications.
6. Advanced Digital Communication Systems, NIIT, PHI
7. Digital Communication, Bernard Sklar, Pearson Education Asia.
Digital and Analog Communication Systems: K.Sam Shanmugam, John Wiley

INSTITUTE OF TECHNOLOGY
GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR
SCHEME OF B.Tech. III[rd] SEMESTER
ELECTRONICS & COMMUNICATION ENGINEERING

VI[th] SEMESTER

S. No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	ECETh 3201	Digital Signal Processing	3	1		40	60	100	4
2.	ECETh 3202	Data Communication	3	1		40	60	100	4
3.	ECETh 3203	Digital Hardware Design	3	1		40	60	100	4
4.	ECETh 3204	Antenna & Wave Propagation	3	1		40	60	100	4
5.	ECETh 3205	VLSI Fabrication Technology	3	1		40	60	100	4
6.	ECEPr 3201	Digital Signal Processing Lab			3	30	20	50	2
7.	ECEPr 3202	Advanced Communication Lab			3	30	20	50	2
8.	ECEPr 3203	Digital Hardware Design Lab			3	30	20	50	2
9		Industrial Training*							
			15	**5**	**9**	**290**	**360**	**650**	**26**

***To be done after 6[th] semester and would be evaluated in 7[th] semester.**

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3201	3	1		3 hours	40	60	4

DIGITAL SIGNAL PROCESSING

UNIT – I

Realization of Systems: Realization of digital linear system, Signal flow graph. Structures for realization of discrete time systems, Structures for IIR and FIR systems, State space system analysis and structures, Representation of numbers, Quantization of filter coefficients, Round off effects in digital filters, Introduction to digital signal processors.

UNIT – II

Infinite Impulse Response Filter design (IIR): Features of IIR filters, Design stages, Filter design by Approximation of Derivatives, Impulse invariance method, Bilinear transformation method, Butterworth and Chebyshev Design Method, Frequency Transformations in Analog and Digital domain. .

UNIT – III

Finite Impulse Response (FIR) Filter Design: Linear phase response- Symmetric and Antisymmetric, Design by Window method, Optimal method, Rectangular, Triangular, Hamming, Blackman & Kaiser Window, Frequency sampling method, Design of FIR differentiators, Design of Hilbert transformer, Comparison of various design methods.

UNIT – IV

Multirate DSP: Introduction, Sampling Rate Conversion by rational factor, Decimation of Sampling rate by an Integer factor, Interpolation of sampling rate by an Integer Factor, Sampling rate alteration or conversion by a rational factor. Filter design and implementation for sampling rate alteration or conversion: Direct form FIR digital filter structures, Polyphase filter structure, Time varying digital filter structures. Sampling rate conversion by an arbitrary factor: First order approximation & Second order approximation method. Applications of Multirate Digital Signal Processing (MDSP).

UNIT – V

Applications of Digital Signal Processing: Introduction, Applications of DSP: Digital Sinusoidal Oscillators, Digital Time Control Circuits, Digital Comb Filters. Applications in broader sense: Removal of noise from pictures, Applications of DSP to Radar, Applications of DSP in Image Processing, Applications of DSP in speech processing.

SUGGESTED BOOKS & REFERENCE:-

1. *"Digital Signal Processing", J. Johnson, Pearson - PHI*
2. *"Digital Signal Processing", Proakis, Manolakis & Sharma, Pearson Education*
3. *"Digital Signal Processing", Nair, PHI*
4. *"Discrete Time Signal Processing", Oppenheim & Schafer, Pearson - PHI*
5. *"Digital Signal Processing", Vallavaraj, Salivahanan, Gnanapriya, TMH*
6. *"Digital Signal Processing", Hussain, Umesh Publications.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3202	3	1		3 hours	40	60	4

DATA COMMUNICATION

UNIT- I

Model of digital communication system, OSI Reference, TCP/IP, ATM Reference Model, Characteristics of signals, basic concepts, Analog and digital transmission, parallel and serial transmission, Multi formats, T1, E1, SONET, SDH, QC, Asynchronous and Synchronous transmission, simplex, half duplex and duplex, different guided and unguided media, Wireless & Mobile, channel capacity.

UNIT-II

Review of different types of Encoding.

MAC Protocols, Network topologies, error detection techniques like parity check, LRC and CRC (Cyclic Redundancy Check) Implementations using shift register method. Interfacing standard: RS232, RS423A, Data link control, Flow control using stop and wait ,DRQ, go back to N ARQ and selective Reject ARC, Data link Control protocol :DLC,SDLC.

UNIT- III

Circuit Switching, Circuit Switched Networks, Switching concept, space, division switching. Time division switching, Packet Switching, principle. Switching techniques, Comparison with circuit switching, Routing and congestion control algorithm. Application of spread spectrum.

UNIT- IV

Layered network model, OSI layer standard, medium access control, Network protocol, internet working, TCP-IP, IPV-4, IPV-6, Ethernet, ISDN, B-ISDN, ATM, binary synchronous character in BSC frame.

UNIT- V

Applcation Layer: DNS, Telnet, TFP, SMTP, World Wide Web, HTML, URL, HTTP.

IEEE-802.2 LLC, IEEE 802.3 Ethernet, IEEE 802.5 MAC Frame format, IEEE 802.11 Wireless Local Area Network: Layered Architecture, DCF, PCF, MAC Frame of IEEE 802.11, Physical layer of IEEE 802.11.

SUGGESTED BOOKS & REFERENCE:-

1. *Computer Network by Tancnbaun pcarson edition.*
2. *Data communication and Computer network by Frojon; TM.*
3. *Data Networks, Dimitri P. Bertsekas, Robert G. Gallager, Prentice-Hall*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3203	3	1		3 hours	40	60	4

DIGITAL HARDWARE DESIGN

UNIT – I

Microprocessor Applications:.Interfacing scanned multiplexed displays and liquid crystal displays, Interfacing matrix keyboard, Stepper motor interfacing, Case studies of microprocessor based systems.

Serial I/O & Data communication: RS 232c, Modern etc., Various BUS Standards, Introduction to ISA, EISA (82350 chip set), MCA and local bus structure.

UNIT –II

Review of Evolution of Advanced Microprocessors: 8086, 8088, 186/286/386/486/Pentium. Familiarization with IBM Compatible Pentium based PC´s with advantage of coprocessors, RISC & CISC processor.

Brief Introduction to Processor such as Power PC MIPS, CYRIX, AMD´s, Motorola series.

UNIT –III

Microcontroller: Introduction to 8051 microcontroller, Architecture, Memory Organization, Port Operation, Memory Interfacing, Introductory Programming, Assembler Directives.

UNIT –IV

Interrupt and Timer/Counter: Interrupts, Timers/Counters, Programming Timer Interrupt, Programming external Hardware Interrupt, Interrupt priority in 8051.

Application: Interface to LED and LCD, Keyboard, 7 Segment display, ADC and DAC Interfacing, Stepper motor Interfacing and DC motor Interfacing, GSM module Interfacing.

UNIT –V

Design Methodology, Life Cycle, and Modelling of Embedded Systems: Software Life Cycle, Embedded Life Cycle, Modeling of Embedded Systems, Simulation & Emulation.

Networks for Embedded Systems: Serial Communication Basics, RS-232model, I^2C model, CAN and CAN Open, SPI, SCI, Introduction to Device Drivers.

SUGGESTED BOOKS & REFERENCE:-

1. Microprocessor and Interfacing Programming & Hardware, Douglas V Hall, TMH.
2. Advanced Microprocessor and Peripherals, A K Rai, K M Burchandi, TMH.
3. The Intel Mcroprocessor, Barray B Brey, Pearson Education.
4. The 8051 Microcontroller & Embedded System, 2nd Edition, M Ali Mazidi, J G Mazidi, Pearson Education.

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3204	3	1		3 hours	40	60	4

ANTENNA AND WAVE PROPAGATION

UNIT – I

Fundamental Parameters of Antenna: Introduction, Radiation Pattern, Radiation Power Density, Beam-width, Directivity, Antenna Efficiency, Gain, Bandwidth, Polarization, Antenna Radiation Efficiency, Friss Transmission Equation.

UNIT – II

Electromagnetic Radiation: Short electric dipole, Half wave dipole, Radiation from a small current element, power radiated, Radiation from a half wave dipole, Power radiated, Radiation resistance, Isotropic radiators and radiation pattern, Effective length, Antenna top loading and tuning effect of earth.

UNIT – III

Antenna Arrays and Their Design: Broadside and End fired arrays Collinear array, Array of point source, Non isotropic but similar point sources, Pattern Multiplication, Linear array with n Isotropic point sources of equal amplitude and spacing, Binomial, Dolph Tchebyscheff arrays.

UNIT – IV

Practical Antennas: Resonant and Non resonant antennas, Tower radiator, Long wire antenna, V antenna, Rhombic antenna, Loop antenna, Folded Dipole Antenna, Yagi -Uda Antenna, Reflector Antenna, Helical Antenna, Turnstile Antenna, Babinet's Principle, Horn Antenna, Micro-strip Antenna, Dielectric Resonator Antenna, Smart Antenna

UNIT – V

Wave Propagation : Modes of propagation of EM waves, UHF and Microwave Propagation, sky wave, Surface wave, Space wave range and fields calculations, Ionosphere characteristics, Earth's magnetic field, Ionospheric propagation, Refractive index at high frequencies, Mechanism of radio wave bending, critical frequency, Effect of earth's magnetic fields, Effective dielectric constant and conductivity, MUF, Skip distance, Optimum working frequency, Multi hop propagation, Ionosphere abnormalities, Troposheric propagation, Effect of earth's curvature and dielectric constant, Tropospheric scatter and Duct propagation.

SUGGESTED BOOKS & REFERENCE:-

1. Antenna and Wave Propagation – K.D. Prasad, Satya Pub.
2. Electromagnetic Waves and Radiating Systems - E.C.Jordan and K.G.Balmain, Prentice Hall India
3. Antennas- John D. Kraus, McGraw Hill.
4. Antenna & Wave Propagation- Robert E.Collin, McGraw Hill
5. Antenna Theory : Analysis and Design- C.A. Balanis, Wiley

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh3205	3	1		3 hours	40	60	4

VLSI FABRICATION TECHNOLOGY

UNIT-1

Crystal growth, wafer preparation, **Epitaxy:** Electronic Grade Silicon, Czochralski crystal Growth, Silicon Shaping, Processing considerations.

Epitaxy: Vapor phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators, Epitaxial Evaluation, Growth Mechanism and kinetics.

UNIT-2

Oxidation: Kinetics of Silicon dioxide growth for thick, thin and ultrathin films. Oxidation technologies in VLSI and ULSI, Characterization of oxide films, High k and low k dielectrics for ULSI.

UNIT-3

Impurity Incorporation: Solid State Diffusion – Fick's equation, Atomic Diffusion Mechanisms, Measurement Techniques, Diffusion in polysilicon and silicon di-oxide diffusion systems.

Ion Implantation – Range theory, Equipments, Annealing, Shallow Junction, High Energy Implementation.

UNIT-4

Lithography: Optical Lithography, Optical Resists, Contact & Proximity Printing, Projection Printing, Electron Beam Lithography: Resists, Mask Generation. Electron Optics: Roster Scans & Vector Scans, X-ray lithography, Ion Beam lithography.

UNIT-5

Chemical Vapour Deposition Techniques: CVD techniques for deposition of polysilicon, silicon dioxide, silicon nitride and metal films.

Metal Film deposition: Evaporation and sputtering techniques. Failure mechanisms in metal interconnects; Multi-level metallisation schemes.

SUGGESTED BOOKS & REFERENCE:-

1. *S. M. Sze, " VLSI Technology", McGraw Hill Book Co.*
2. *S.K.Gandhi, "VLSI Fabrication Principles", John Wiley and Sons, NY.*
3. *Chen, "VLSI Technology" Wiley, March.*
4. *D.Nagchoudhary, "Principles of Microelectronics Technology", Wheeler (India).*
5. *Plummer, Deal , Griffin "Silicon VLSI Technology: Fundamentals, Practice & Modeling" PH, 2001.*
6. *P. VanZant , "Microchip Fabrication", 5th Edition, MH , 2000.*

INSTITUTE OF TECHNOLOGY
GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR
SCHEME OF B.Tech. III[rd] SEMESTER
ELECTRONICS & COMMUNICATION ENGINEERING

VII[th] SEMESTER

S. No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	ECETh 4101	Wireless & Mobile Communication	3	1		40	60	100	4
2.	ECETh 4102	VLSI Design & VHDL	3	1		40	60	100	4
3.	ECETh 4103	Power Electronics	3	1		40	60	100	4
4.	ECETh 4104	Microwave Engineering	3	1		40	60	100	4
5.	ECETh 410-	Elective – I	3	1		40	60	100	4
6.	ECEPr 4101	Project-1			3	30	20	50	2
7.	ECEPr 4102	Seminar			3	30	20	50	2
8.	ECEPr 4103	VLSI Design & VHDL Lab			3	30	20	50	2
9.	ECEPr 4104	Microwave Engineering Lab			3	30	20	50	2
			15	**5**	**12**	**320**	**380**	**700**	**28**

List of Subjects for Elective – I

S.No.	Code	Name of Subject
1.	ECETh4105	Embedded Systems
2.	ECETh4106	Multirate Systems And Filter Banks
3.	ECETh4107	Speech signal Processing
4.	ECETh4108	Wireless Sensor Network
5.	ECETh4109	Artificial intelligence & Expert Systems
6.	ECETh4110	Neural Network & Fuzzy Logic System
7.	ECETh4111	Biomedical Instrumentation
8.	ECETh4112	Semiconductor Device Modeling and Simulation

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh4101	3	1		3 hours	40	60	4

WIRELESS & MOBILE COMMUNICATION

UNIT - I

Introduction to Wireless Communication System: Evolution mobile communications, Mobile radio around the world, Types of Wireless communication system, comparison of Common wireless system, Trend in Cellular radio and personal Communication. Second generation Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop(WLL), Bluetooth and Personal Area Networks

The Cellular Concept-System design Fundamentals:

Cellular System, Hexagonal geometry cell and frequency reuse concept, channel assignment strategies, Distance to frequency reuse ratio, channel & Co-channel interference reduction factor, S/I ratio consideration and calculation for minimum Co-channel and adjacent interference, Handoff strategies, Umbrella Cell Concept, Trunking and Grade Of Service(GOS),Improving Coverage & Capacity in cellular System-splitting, cell sectorization, Repeaters, Micro cell zone concept.

UNIT – II

Mobile Radio Propagation: Large Scale Path Loss : Free space propagation model, The three basic propagation Mechanism: reflection, diffraction, scattering, Practical link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse response model of a Multipath Channel, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, Rayleigh and Ricean Distributions, Statistical for models multipath fading channels and diversity techniques in brief.

UNIT-III

Modulation Techniques: Orthogonal Frequency Division Multiplexing, Performance of Digital Modulation in Slow-Flat Fading Channels and Frequency Selective Mobile Channels. Equalization: Survey of Equalization Techniques, Linear Equalization, Non-linear Equalization, Algorithms for Adaptive Equalization.

UNIT – IV

Multiple Access Techniques for Wireless Communication: Introduction, FDMA, TDMA, CDMA:DS-SS,FH-SS, space division multiple access, packet radio, capacity of a cellular systems.

UNIT – V

GSM: System architecture, GSM subsystems, GSM communication frame, 3G system, GSM: Services: Mobile services, Bearer Services, Tele Services, Supplementary Services, Components & Working of WLAN, Transmission Media for WLAN, Modulation Techniques for WLAN (DSSS, FHSS), IEEE 802.11 Standards, & Protocol for WLAN.

The future of mobile communications, 3G, 4G, 802.11a/b/g, 802.16 concepts of adhoc network and mobile computing.

SUGGESTED BOOKS & REFERENCES:-

1. Kamilo Feher, "Wireless Digital Communications", PHI
2. Rapport T.S., "Wireless Communications, Principles and Practice", PHI
3. Lee W.C.Y., "Mobile Cellular Telecommunication", MGH
4. Pandya R, Mobile & Personal Communication System, PHI
5. Haykins S & Moher M, Modern Mobile Wireless Communication, Pearson Ed.

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh4102	3	1		3 hours	40	60	4

VLSI DESIGN & VHDL

UNIT I

Evolution of VLSI, VLSI Design Methodology, VLSI Design Flow, Full Custom & Semicustom Design Approach, FPGA Design, CAD Technology, MOS structure, MOS system under external bias condition, Structure and operation of MOSFET, N-MOS and P-MOS technology, Accumulation, Depletion, Inversion, I-V characteristics, Threshold voltage, Body Effect, MOSFET Capacitance, Latch-up , Second order Effects.

UNIT II

CMOS Fabrication process flow, CMOS N-well process, Layout design rules, stick diagram, CMOS design rules, Diagram for N-MOS and CMOS inverter & Gates, P-well process, Twin-Tub process, Fabrication of bipolar Transistor.

UNIT III

MOS Inverter static characteristics, CMOS inverter, Voltage transfer characteristics, Noise margin, CMOS inverter circuit operation, Switching characteristics, Delay time definitions, Power dissipation- static and dynamic power, BiCMOS Inverter.

UNIT IV

Combinational MOS logic circuit, CMOS logic circuits, Complex logic circuit, CMOS Transmission Gate, Pseudo NMOS logic, Sequential MOS logic circuits, Latches and Flip Flop circuits.
Dynamic CMOS logic circuits, Domino CMOS logic, NORA, ZIPPER logic

UNIT V

Introduction to VHDL, EDA tools, Entity and Architecture declaration, Data Objects, Data Types, Operators, Concurrent and Sequential Statements, Various Architecture Styles of Modeling, Design of Combinational and Sequential Circuits.

.

SUGGESTED BOOKS & REFERENCE:-

1.S.M. kang & Y. Leblebici, CMOS digital integrated circuits: analysis and design, MH
2. S.M. Sze, VLSI Technology, MH
3. Neil Waste & Kamran Eshraghian, CMOS VLSI design, Pearson
4. W. Wolf, Modern VLSI Design, Pearson Pub.
5. J Bhaskar, A VHDL Primer, Pearson Edu.
6. Fundamental of Digital Logic Design with VHDL, Brown & Vranesic, MGH Pub.

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh4103	3	1		3 hours	40	60	4

POWER ELECTRONICS

UNIT – I

Thyristor characteristics, Two transistor model of Thyristor. Thyristor Turn–On di/dt protection, dv/dt protection, Thyristor Turn–On , Series operation of Thyristor, Parallel operation of thyristor, Thyristor Commutation Technique, Natural Commutation, Forced Commutation, Self Commutation, External pulse Commutation, Load side Commutation, Line side Commutation.

UNIT – II

Inverters:- Classification of Inverters, Depending upon the various types of Commutation, Series and Parallel inverters, Self Commutation inverters, Single and three phase bridge inverters, Voltage Control of three phase inverters, Harmonic reductions.

UNIT – III

DC Choppers:- Introduction, Principle of Step-Down operation, Step Down chopper with RL load, Principle of Step-Up operation, Performance parameters, Switch mode regulators, Thyristor based chopper circuit, Impulse commutated choppers, Effects of Source and Load inductance, Impulse commutated three thyristor chopper, Resonant pulse choppers.

UNIT – IV

Controlled Rectifiers:- Introduction, Principle of Phase controlled converter operation, Single Phase semi converter with RL load, Single Phase full converter with RL load, Single phase dual converters, Single phase series converters, Three phase half wave converters, Three phase semi converters with RL load, Three phase full converter with RL load, Three phase Dual converters, Power factor improvements, Excitation angle control, PWM control, Sinusoidal Pulse Width Modulation, Design of converter circuits.

UNIT – V

AC Voltage Controllers:- Introduction, Principle of On-Off control, Principle of Phase control, Single Phase Bidirectional controller with resistive loads, Single Phase controller with inductive loads, Three phase half wave controller, Three phase full wave Controller, Three phase bidirectional delta connected controllers, Cycloconverters, Single phase to single phase, Single phase to three phase & Three phase to three phase cycloconverter, Reduction of output harmonics, AC Voltage controller with PWM control, Design of AC voltage controller circuits, Effect of Source and Load inductances.

SUGGESTED BOOKS & REFERENCE:-

1. *P.S.Bhimbra, "Power Electronics",*
2. *Rashid, "Power Electronics", Pearson Publication.*
3. *H.C.Rai, "Power Electronics", Galgotia Publication.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh4104	3	1		3 hours	40	60	4

MICROWAVE ENGINEERING

UNIT – I

Microwave Waveguides: Introduction, Types of waveguides, TE and TM modes in Rectangular wave guide, Dominant mode, Various field components of TE and TM modes, Cut off frequency of a wave guide, Phase velocity, Group velocity, Guide wave length, Wave impedance, Power transmission in rectangular wave guide, TE and TM modes for Circular wave guide.

UNIT –II

Microwave tubes and Measurements: Introduction, High frequency limitation of conventional tubes, Two cavity Klystron amplifier, Bunching process, Applegate diagram, Analysis of two cavity Klystron, Reflex Klystron: Performance characteristics, Travelling Wave Tube (TWT): Constructional features and operating principle of TWT, Magnetron: Construction and operating principle of cavity magnetron, Analysis of Cylindrical Magnetron, Mode jumping.

UNIT –III

Solid State Microwave Devices: Introduction to Microwave Transistors, MESFETs Varactor Diode, Parametric Amplifiers, Masers, PID diode: Equivalent circuit, Operation and Application; Schottky Barrier Diodes, Tunnel Diode, Transferred Electron Devices: Gunn Effect, Gunn diode as an amplifier & Oscillator, Avalanche transit time devices: IMPATT diode, TRAPATT diode, BARITT diode.

UNIT –IV

Microwave Network Analysis: Scattering Matrix, Properties of Scattering Matrix, Microwave T junctions: H-plane Tee, E-plane Tee, Magic Tee junction and its applications; Directional Couplers: Introduction and Scattering Matrix of a Directional Coupler; Wave guide Joints, Bends, Corners, Twists, Posts and Tuning Screws, Rate Race Junction, Isolator, Circulator, Attenuator, Phase Shifters, Ferrite Devices, Faradays rotation in ferrites.

UNIT –V

Microwave measurements & MMIC: Microwave Bench, Measurement of Power, Wavelength, Frequency, Impedance, SWR, Attenuation, Q and Phase Shift, Microwave Integrated Circuits: MMIC´s, Strip Lines, Micro strip Lines.

SUGGESTED BOOKS & REFERENCE:-

1. *Microwave Circuits and Devices, S Y Lio, PHI*
2. *Foundation of Microwave Engineering, R E Collin, McGraw Hill*
3. *Microwave Engineering, Annapurna Das & Sisir K Das, TMH*
4. *Microwave Engineering, d m Pozar, John Wiley & Sons*
5. *Microwave and Radar Engineering, M Kulkarni, Umesh Publication*

LIST OF ELECTIVE SUBJECTS

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh410-	3	1		3 hours	40	60	4

1. EMBEDDED SYSTEMS

UNIT-I Introduction to embedded systems: Classification, Characteristics and requirements.

UNIT-II Timing and clocks in Embedded systems, Task Modeling and management, Real time operating system issues.

UNIT-III Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing.
Modeling and Characterization of Embedded Computation System.

UNIT-IV Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

UNIT-V Fault-Tolerance; Formal Verification.
SUGGESTED BOOKS & REFERENCE:-

1. H.Kopetz, "Real-Time Systems", Kluwer, 1997.
2. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer 1995.

2. MULTIRATE SYSTEM & FILTER BANKS

UNIT-I
Fundamentals of Multi-rate Systems: Basic multi-rate operations, interconnection of building blocks, poly-phase representation, multistage implementation, applications of multi-rate systems, special filters and filter banks.

UNIT-II
Maximally decimated filter banks: Errors created in the QMF bank, alias-free QMF system, power symmetric QMF banks, M-channel filter banks, poly-phase representation, perfect reconstruction systems, alias-free filter banks, tree structured filter banks, trans-multiplexers.

UNIT-III
Para-unitary Perfect Reconstruction Filter Banks: Lossless transfer matrices, filter bank properties induced by paraunitariness, two channel Para-unitary lattices, M-channel FIR Para-unitary QMF banks, transform coding.

UNIT-IV
Linear Phase Perfect Reconstruction QMF Banks: Necessary conditions, lattice structures for linear phase FIR PR QMF banks, formal synthesis of linear phase FIR PR QMF lattice.

UNIT- V
Cosine Modulated Filter Banks: Pseudo-QMF bank and its design, efficient poly-phase structures, properties of cosine matrices, cosine modulated perfect reconstruction systems.

SUGGESTED BOOKS & REFERENCE:-
1.P.P. Vaidyanathan, "Multirate Systems and Filter Banks" Pearson Education (Asia) Pte. Ltd, 2004.

2 Gilbert Strang and Truong Nguyen, "Wavelets and Filter Banks" Wellesley-Cambridge Press, 1996.
3 N. J. Fliege, "Multirate Digital Signal Processing" John Wiley & Sons, USA, 2000.

3. SPEECH SIGNAL PROCESSING

UNIT – I

Speech: Production, Perception and Acoustic-Phonetic Characterization: Introduction, Speechproduction process, Time and frequency domain representation of speech, Speech sounds and features, The vowels, Diphthongs, Semivowels, Nasal Consonants, Unvoiced Fricatives, Voiced Fricatives, Voiced & Unvoiced Stops, Acoustic-Phonetic Approach to Speech Recognition, Statistical Pattern-Recognition Approach to Speech Recognition, AI Approaches to Speech Recognition, Neural Networks and their Application to Speech Recognition.

UNIT – II

Spectral Analysis of Speech: Short time Fourier analysis, filter bank design, speech coding, subband coding of speech, transform coding, channel vocoder, formant vocoder, cepstral vocoder, vector quantizer coder.

UNIT – III

Speech Synthesis: Pitch extraction algorithms, Gold Rabiner pitch trackers, autocorrelation pitch trackers,voice/unvoicedunvoiced detection, homomorphic speech processing, homomorphic systems for convolution, complex cepstrums, pitch extraction using homomorphic speech processing.

UNIT – IV

Automatic speech recognition systems: Isolated word recognition, connected word recognition, large vocabulary word recognition systems, pattern classification, DTW, HMM, speaker recognition systems, speaker verification systems, speaker identification systems.

UNIT – V

Hidden Markov Models: Discrete-Time Markov Processes, Extensions to HMMs, Coin-toss Models, The Urnand- Ball Model, Elements of an HMM, HMM generator of observations. Three Basic problems for HMMs and their solutions, Probability Evaluation, 'Optimal' State sequence, Parameter estimation, Re-estimation procedure. HMM types, continuous observation densities in HMMs, Autoregressive HMMs, Variants on HMM,structures, Inclusion of Explicit State Duration Density in HMMs, Optimization Criterion – ML, MMI and MDI, Comparisons of HMMs.

SUGGESTED BOOKS & REFERENCE:-

1. Fundamentals of Speech Recognition, Rabiner L. and Juang B., Pearson Education
2. Owens F.J., ''Signal Processing of Speech'', Macmillan New Electronics

4. WIRELESS SENSOR NETWORK

UNIT- I

Wireless Sensor Network: Introduction, Architecture, Hardware and Software used in Wireless Sensor Network.

UNIT- II

Sensor network application: Motion monitoring, Environmental monitoring, Generic Architecture, Sensor network Evolution.

UNIT- III

Wireless Sensor Network : Design , Goals and Issues , Sensor deployment, Scheduling and coverage issues, self configuration and topology control, Querying, data collection and processing, Collaborative information processing and group connectivity.

UNIT- IV

Wireless Sensor Routing Protocols: Data Centric, Hierarchical, Location based, Energy efficient routing,

UNIT- V

Sensor Network Challenges – Miniaturization, power management, scalability, remote management, usability, standardization and security, System Challenges- Tiny OS, Network Sensor Platforms.

SUGGESTED BOOKS & REFERENCE:-

1. *Building Wireless Sensor Networks by Robert Faludi Binding: Paperback Publisher: O'reilly Released: 2011*
2. *Wireless Sensor Networksby Zhao Feng, Guibas Leonidas Binding: Paperback Publisher: Elsevier India Released: 2004*
3. *Wireless Sensor Networks by C. S Raghavendra, Krishna M. Sivalingam, Taieb Znati Binding: Paperback Publisher: Springer/bsp Books Released: Rpt.2010*

5. ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

UNIT – I

Definition of AI, Brief history of AI, General problem Solving Approaches in AI- Learning Systems, Knowledge representation and reasoning, Planning, Knowledge Acquisition, Intelligence search, Logic Programming, Soft computing, Applications of AI techniques, Characteristic requirement for the realization of intelligent system, Programming languages for AI, Architecture for AI machine

UNIT – II

Cognitive perspective of pattern recognition- Template Matching, Prototype matching, feature based approach, Computational approach; Cognitive models of memory- Atkinson-Shiffrin´s model, Tulving´s model, Parallel distributed processing approach; Understanding of problem; Cybernetic view to cognition

UNIT – III

Production rules, Working memory, Control Unit/Interpreter, Conflict Resolution strategies, Types of production systems-Commutative Production system, Decomposable Production system, Forward verses Backward reasoning, Merits of a Production system- Isolation of knowledge and control strategy, Direct Mapping onto State-space, Modular Structure of Production rules, Knowledge base Optimization in production system. .

UNIT – IV

Production Solving by Intelligent Search: General problem solving approaches- Breadth first search, depth first search, Iterative deepening search, Hill Climbing, Simulated annealing; Heuristic Search- for OR Graph, Iterative deepening algorithm, AND-OR Graph, Adversary Search- MINIMAX algorithm, Alpha-Beta heuristics.

UNIT – V

Logic of Propositions and Predicates- Formal definition, Propositional Logic-Semantic method for theorem proving, Syntactic method for theorem proving, Resolution in Propositional Logic, Predicate Logic, Unification of Predicates, Robinson´s Interference Rule, Types of Resolution, Soundness and Completeness of Logic.

SUGGESTED BOOKS & REFERENCE:-

1. *Artificial Intelligence and Soft Computing, Amit Konar*
2. *Journal of Artificial Intelligence, ScienceDirect, Elsevier Publication*
3. *IEEE Transaction on Computational Intelligence and AI*
4. *Artificial Intelligence By Elaine Rich and Kevin Knight , Tata McGraw Hill.*
5. *Introduction to AI and Expert Systems by Dan W.Patterson, PHI.*

6. NEURAL NETWORK & FUZZY LOGIC SYSTEM

UNIT-I

Introduction to ANS Technology: Elementary Neurophysiology, Models of a Neuron, Neural Networks viewed as directed graphs, Feedback, from neurons to ANS, Artificial Intelligence and Neural Networks.

UNIT-II

Learning and Training: Hebbian, Memory based, Competitive, Error-Correction Learning, Credit Assignment Problem: Supervised and Unsupervised learning, Memory models, Recall and Adaptation. Network Architectures, Single-layered Feed-forward Networks, Multi-layered Feedforward Networks, Recurrent Networks, Topologies.

UNIT-III

Algoritms for ANN: Activation and Synaptic Dynamics, Stability and Convergence. A Survey of Neural Network Models : Single-layered Perceptron – least mean square algorithm, Multi-layered Perceptrons – Back propagation Algorithm, XOR – Problem, The generalized Delta rule, BPN Applications, Adalines and Madalines – Algorithm and applications.

UNIT-IV

Applications: The Traveling salesperson problem, Talking Network and Phonetic typewriter : Speech Generation and Speech recognition, Character Recognition and Retrieval, Handwritten Digit rcognition.

UNIT-V

Adaptive Fuzzy Systems: Introduction to Fuzzy sets and operations, Examples of Fuzzy logic, Fuzzy Associative memories, Fuzziness in neural networks, Comparison of Fuzzy and neural Truck-Backer upper control systems.

SUGGESTED BOOKS & REFERENCE:-

1. Artificial Neural Networks by B. Yagna Narayan, PHI
2. Neural Network: A Comprehensive Foundation, Haykin, Pearson Education

7. BIOMEDICAL INSTRUMENTATION

UNIT I

Basic concepts of medical instrumentation, Classification, Interfering and Modifying Inputs, Compensation Techniques, Biostatistics, Static and Dynamic Characteristics, Design Process for Medical Instruments. Measurements & Sensors- Resistive, Inductive, Capacitive, Piezoelectric, Thermocouple, Thermistor, Radiation Thermometry, Optical Measurements- Radiation source, Radiation Sensor, Geometrical and Fiber Optics. Amplifiers and Signal Processing Units.

UNIT II

Origin of Biopotentials, Electrical Activity of Excitable Cells, Functional Organization of Peripheral Nervous System, Electroneurogram (ENG), Electrocardiogram (ECG)-Anatomy and Function of Heart, Electrical behavior of Cardiac cells, Body-Surface potentials.

UNIT III

Normal and Abnormal Cardiac Rhythms , Electroretinogram (ERG)-Anatomy of Vision, Electrophysiology of Eye, Special properties of ERG, Electro-oculogram (EOG), Electroencephalogram (EEG)-Anatomy and Function of Brain, Cerebral Cortex, Bioelectric potential from Brain, Resting Rhythms, Clinical EEG, Sleep patterns, Volume-Conductor Problem.

UNIT IV

Biopotential Electrodes, Electrode-electrolyte Interface, Polarization, Polarizable and nonpolarizable Electrodes, Electrode behavior and Circuit Model, Electrode-skin Interface, Motion artifact, Body-surface Recording Electrodes- Metal-plate, Suction, Floating, Flexible Electrodes, Internal Electrodes, Electrode Arrays, Microelectrodes- Metal, Supported-Metal, Micropipet Electrodes, Microelectronic Technology, Electrical properties of Microelectrodes, Electrodes for Electric stimulation of Tissue.

UNIT V

Measurement of Flow and Volume of Blood: Indicator-Dilution method - with Continuous Infusion, - with Rapid Injection, Electromagnetic Flowmeter- Principle, AC Flowmeter, DC Flowmeter, Probe Design, Ultrasonic Flowmeters- Transducers.

SUGGESTED BOOKS & REFERENCE:-

1. *Handbook of Biomedical Instrumentation, R S Khandpur, Tata Mcgraw Hill Publication.*
2. *Medical Instrumentation- Application and Design, J G Webster, Wiley Student Edition.*
3. *Bioinstrumentation, J G Webster, Wiley Student Edition.*
4. *Related papers in journals in Elsevier.*
5. *Bio medical Instrumentation and Measurements , Leslie Cromwell*
6. *Principles of Bio medical Instrumentation, Richard Aston*

8. SEMICONDUCOTR DEVICE MODELING & SIMULATION

UNIT I

Semiconductor Electronics Review: Elements of Semiconductor Physics, Physical Operation of a ***PN*** Junction, MOS Junction, MS Junction.

PN–Junction Diode and Schottky Diode: DC Current-Voltage Characteristics, Static Model, Large-Signal Model, Small-Signal Model, Schottky Diode and its Implementation in SPICE2, Temperature and Area Effects on the Diode Model Parameters, SPICE3, HSPICE and PSPICE Models.

UNIT II

Bipolar Junction Transistor (BJT): Transistor Convention and Symbols, Ebers-Moll Static Model, Ebers-Moll Large-Signal Model, Ebers-Moll Small-Signal Model, Gummel-Poon Static Model, Gummel-Poon Large-Signal Model, Gummel-Poon Small-Signal Model, Temperature and Area Effects on the BJT Model Parameters, Power BJT Model, SPICE3, HSPICE and PSPICE Models

UNIT III

Junction Field-Effect Transistor (JFET): Static Model, Large-Signal Model and its Implementation in SPICE2, Small-Signal Model and its Implementation in SPICE2, Temperature and Area Effects on the JFET Model Parameters, SPICE3, HSPICE and PSPICE Models

Metal-Oxide-Semiconductor Transistor (MOST): Structure and Operating Regions of the MOST, LEVEL1 Static Model, LEVEL2 Static Model, LEVEL1 and LEVEL2 Large-Signal Model, LEVEL3 Static Model, LEVEL3 Large-Signal Model, The Effect of Series Resistances, Small-Signal Models, The Effect of Temperature, BSIM1, BSIM2, SPICE3, HSPICE and PSPICE Models

UNIT IV

BJT Parameter Measurements: Input and Model Parameters, Parameter Measurements.

MOST Parameter Measurements: LEVEL1 Model Parameters, LEVEL2 Model (Long-Channel) Parameters, LEVEL2 Model (Short-Channel) Parameters, LEVEL3 Model Parameters, Measurements of Capacitance, BSIM Model Parameter Extraction.

Noise and Distortions: Noise, Distortion.

UNIT V

Metal-Semiconductor Field-Effect Transistor (MESFET), Ion-Sensitive Field-Effect Transistor (ISFET) and Semiconductor-Controlled Rectifier (Thyristor): The MESFET, The ISFET, The Thyristor.

SUGGESTED BOOKS & REFERENCE:-

1. *Paolo Antognetti and Giuseppe Massobrio, **Semiconductor Device Modeling with SPICE,** 2nd edn., McGraw-Hill, New York.*
2. *Richard S. Muller, Theodore I. Kamins, and Mansun Chan, **Device Electronics for Integrated Circuits**, 3rd edn., John Wiley and Sons, New York, 2003. ISBN: 0-471-59398-2.*
3. *H. Craig Casey, **Devices for Integrated Circuits: Silicon and III-V Compound Semiconductors**, John Wiley, New York.*
4. *Dieter K. Schroder, **Semiconductor Material and Device Characterization**, John Wiley and Sons, New York.*

INSTITUTE OF TECHNOLOGY
GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR
SCHEME OF B.Tech. III[rd] SEMESTER
ELECTRONICS & COMMUNICATION ENGINEERING

VIII[th] SEMESTER

S. No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	ECETh 4201	Radar & Satellite Communication	3	1		40	60	100	4
2.	ECETh 4202	Principle of Management	3	1		40	60	100	4
3.	ECETh 4203	Optical Fiber Communication	3	1		40	60	100	4
4.	ECETh 4204	Elective – II	3	1		40	60	100	4
5.	ECEPr 4201	Project-2			6	30	20	50	2
6.	ECEPr 4202	Comprehensive Viva-voce					50	50	2
7.	ECEPr 4203	Circuit Simulation Lab			3	30	20	50	2
8.	ECEPr 4204	Optical Fiber Communication Lab			3	30	20	50	2
			12	**4**	**12**	**250**	**350**	**600**	**24**

List of Subjects for Elective – II:

S.No.	Code	Name of Subject
1.	ECETh4204	Digital Image Processing
2.	ECETh4205	Cryptography & Network Security
3.	ECETh4206	Radar Engineering
4.	ECETh4207	Mobile Computing
5.	ECETh4208	NanoTechnology
6.	ECETh4209	Vacuum Technology
7	ECETh4210	Optimization Techniques
8	ECETh4211	Stochastic Process

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh4201	3	1		3 hours	40	60	4

RADAR & SATELLITE COMMUNICATION

UNIT – I

INTRODUCTION: Origin and brief history of satellite communication; Element of satellite communication link; Current status of satellite communication.

ORBITAL MECHANISM AND LAUNCHING OF SATELLITE: Equation of orbit. Describing the orbit, Look angle determination, Azimuth and elevation calculation, Geostationary and other orbit, Orbital perturbation, Orbit determination, Mechanic's of launching a synchronous satellite, selecting a launch vehicle.

UNIT – II

SPACE CRAFT: Satellite subsystem, power supply altitude and orbit control system, Telelmetry and Command, Thermal control system communication subsystem, Space craft antennas, Frequency re-use antennas.

UNIT – III

SATELLITE CHANNEL &LINK DESIGN: Basic transmission theory, Noise temperature, Calculation of system noise temperature. Noise figure, G/T Ratio of earth station, Design of down and uplink using C/N ratio, FM improvement factor for multi channel signal, Link design for FDM/FM, TV signal and Digital signals.

UNIT – IV

MULTIPLE ACCESS TECHNIQUES & EARTH STATION TECHNOLOGY: Frequency Division Multiple Access (FDMA), FDM/FM/FDMA, Time Division Multiple Access, Frame structure and synchronization, Code Division Multiple Access, Space qualification and Equipment Reliability, random Access, Earth station design requirement, earth station subsystem, Monitoring and control, Antenna noise temperature, Tracking, Design of Small earth station, Low noise amplifier, high noise amplifier, VSAT's, Satellite Television Receiver, INMARSAT& INSAT System.

UNIT – V

RADAR: Introduction, Radar block diagram and Operation, Radar Frequencies, Simple form of Radar Equation, Prediction of Range Performance, Minimum Detectable Signals, CW Radar, Tracking Radar, MTI Radar.

SUGGESTED BOOKS & REFERENCE:-

1. Pratt, T &Bastion, C.W. "Satellite Telecommunication", John Wiley & Sons,
2. Roddy, D, "Satellite communication", Prentice Hall, of India Private Limited, New Delhi.
3. Monojit Mitra "Satellite Communication" PHI

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh4202	3	1		3 hours	40	60	4

PRINCIPLE OF MANAGEMENT

UNIT – I

Management concepts, Nature, Scope, Significance, Function and Principle of Management Concepts. Evolution of Management: Early Contribution, Taylor and Scientific management, Fayol´s administrative management, Bureaucracy, Hawthrone Experiments and Human Relations.

UNIT – II

Planning- Concepts, Objectives, Goals, Components and Steps involved in planning process, MBO, Decision making process, Individual and Group Decision Making.

UNIT – III

Organizing- principles, Organization theories, Line & Staff Authority, Centralization, Decentralization, Delegation, Employee´s empowerment, Span of control, Departmentation, Authority and Responsibility.

UNIT – IV

Staffing: Recruitment & Selection, Training & Development, Performance Appraisal Directing: Concept, Direction and Supervision, Co-ordination.

UNIT – V

Communication: Communication Process, Importance of Communication, Barriers to Communication, Controlling: nature, scope, functions, steps and process, control techniques.

SUGGESTED BOOKS & REFERENCE:

1. *Management, Stoner & Freeman, PHI*
2. *Principles of Management, Koontz, O´Donnell Wechrich, McGraw Hill*
3. *The Practice of Management, P F Drucker, Allied Pub*
4. *Essentials of Management, Massie, AITBS*
5. *Principles of Management, Terry and Franklin, AITBS*
6. *Organization and Management, R D Agarwal, TMH*
7. *Management, H Koontz, McGraw Hill*
8. *Fundamentals of Management, Robbins & Dinzo, Pearson India*

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh4203	3	1		3 hours	40	60	4

OPTICAL FIBER COMMUNICATION

UNIT – I

Introduction to optical communication, Principles of light transmission, optical fiber modes and configurations, mode theory for circular wave-guides, single-mode fibers, multimode fibers, numerical aperture, mode field diameter, V-number, fiber materials, fiber fabrication techniques.

UNIT – II

Optical sources, LED´s, LASER diodes, Model reflection noise, Power launching and coupling, Population Inversion, Fiber Splicing, Optical connector, Photo detector, PIN, Avalanche detector, response time, avalanche multiplication noise.

UNIT – III

Signal degradation in optical fibers, attenuation losses, signal distortion in optical waveguides, material dispersion, wave guide dispersion, chromatic dispersion, inter-modal distortion, Pulse broadening in graded index fiber, mode coupling, advanced fiber designs: dispersion shifted, dispersion flattened, dispersion compensating fibers, design optimization of single mode fibers.

UNIT – IV

Coherent optical fiber communication, modulation techniques for homodyne and heterodyne system, optical fiber link design, Rise time budget and link power budget long haul systems, bit error rate, line coding, NRZ, RZ, Block codes, eye pattern.

UNIT – V

Advanced system and techniques, wavelength division multiplexing, optical amplifiers, semiconductor amplifier, EDFA, Comparison between semiconductor and optical amplifier, Gain bandwidth, photonic switching, optical networks, optical fiber bus, ring topology, star architecture, FDDI.

SUGGESTED BOOKS & REFERENCE:-

1. *Optical fiber communication, G Keiser*
2. *Optical communication, J Frames & V K Jam*
3. *Optical communication, A K Ghatak & K Thyagarajan*

LIST OF ELECTIVE SUBJECTS

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh420-	3	1		3 hours	40	60	4

1. DIGITAL IMAGE PROCESSING

UNIT-I

Introduction and Fundamentals: Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT-II

Image Enhancement in Frequency Domain: Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

Image Restoration: A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-III

Color Image Processing: Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening.

UNIT-IV

Registration: Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth.

Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

UNIT-V

Feature Extraction: Representation, Topological Attributes, Geometric Attributes.

Description: Boundary-based Description, Region-based Description, Relationship.

Object Recognition: Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

SUGGESTED BOOKS & REFERENCE:-

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Prentice Hall, Upper Saddle River, NJ.

2. CRYPTOGRAPHY & NETWORK SECURITY

UNIT I

Introduction to security attacks, Services & Mechanism, Introduction to Cryptography, Conventional encryption, Classical encryption techniques- Substituion and Transposition ciphers, Cryptanalysis, Stegnography.

Simplified DES ,Block cipher principles, The data encryption standard, the strength of DEC, Differential and linear Cryptanalysis, Block cipher design principles, Block cipher modes of operation, evaluation criteria for AES, The AES cipher, Triple DES, blowfish

UNIT II

Principle of public key cryptosystem, Public key cryptosystems, Application for public key cryptosystem, requirement for public key cryptography, public key crypto analysis, The RSA algorithm, computational aspects ,The security of RSA, Key managements, Distribution of public key, public key distribution of secret keys, s security requirements for signature scheme.

UNIT III

Elliptic curves cryptography message, authentication and hash function, authentication requirement, authentication functions, message authentication code security of hash function, Hash and Mac algorithm, MDS message digest algorithm, secure hash algorithm(SHA-l).

UNIT IV

Authentication applications – Kerberos – X.509 authentication service – Electronic mail security – PGP – S/MIME – IP security – Web security.

UNIT V

Intruders:-Intrusion techniques, Intrusion detection, Honey pots, firewall design principles, firewall characteristics, Type of firewall, fire wall configurations.

Web security:-Web security threats, web traffic security approaches, SSL architecture, SSL record protocol, change cipher spec protocol, Alert protocol, Handshake Protocol, Cryptographic Computations, Transport layer security, Secure Electronic Transaction.

SUGGESTED BOOKS & REFERENCE:

1. *Cryptography and Network Security, Principles and Practice, William Stallings, PHI*
2. *Cryptography Theory and Practice, Douglas R. Stinso, Champan & hall/CRC*
3. *Applied Cryptography, Bruce Schiener, John Wiley & Sons.*
4. *Network Security & Cryptography, Bernard Menezes, Cengage Learning.*
5. *Introduction to Cryptography, Johannes A Buchmann, Springer-Verlag.*
6. *Network Security: Private Communication in public world, Charlie Kaufman, R Perlman, M Speciner, Prentice Hall.*

3. RADAR ENGINEERING

UNIT-l

The Radar Equation: Introduction, Radar block diagram and operation, radar frequencies, The simple form of radar equation. Prediction of range performances, minimum detectable signals, receiver noise, Integration of radar pulses, Pulse repetition frequency, Antenna parameters

UNIT-2

CW and frequency modulated Radar: The Dopplcr effect, CW Radar, Frequency modulated CW radar, Air bone Dopplcr Navigation, Multiple Frequency CW Radar.

UNIT-3

MTI and PULSE DOPPLER RADAR: Introduction, Delay line canceller, Multiple or staggered ,pulse repetition Frequencies, Range gated Dopplcr filter,MTI Delay Line, Non coherent MTI, Pulse Doppler Radar, MTI from a moving plat form. Radar display

UNIT-4

TRACKING RADAR: Tracking with radar, Sequential lobbing, Conical Scan, Mono pulse Tracking radar, Target reflection characteristics with angular Accuracy, tracking in range, Acquisition, Comparison of trackers, tracking with surveillance radar

UNIT – 5

Radar Cross Section: Cross section for small targets, scattering cross section, Effect of polarization on Cross section, Examples of Target cross section, sphere, flat rectangular plate, flate circular plate, circular cylinder, straight wire, complex target shapes, Rayleigh model, Erlang model, Chi square model, weibull model, long normal model.

SUGGESTED BOOKS & REFERENCE:-

1: Radar Principles by Peyton Z. Peebles ,Jr. John Wiley &Sons ,INC.
2: Introduction to radar System Merrill I. Skolnik Me- Graw Hill

4. MOBILE COMPUTING

UNIT – I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, Hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

UNIT –II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

UNIT –III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT –IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

UNIT –V

Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

SUGGESTED BOOKS & REFERENCE:-

1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra , GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
4. Charles Perkins, Mobile IP, Addison Wesley.
5. Charles Perkins, Ad hoc Networks, Addison Wesley.

5. NANOTECHNOLOGY

UNIT-1

Introduction to Nanotechnology: Essence of Nanotechnology, Nano in daily life, Brief account of nano applications, Properties of nano materials, Properties at nanoscale (optical, electronic and magnetic), Metal nano clusters, Semiconductor nano particles.

UNIT-2

Nano Materials-Metal and Semiconductor Nanomaterials, Quantum Dots, Wells and Wires, Molecule to bulk transitions.

UNIT-3

Carbon Nano Structures :Introduction, Carbon molecules, Carbon clusters, Carbon nanotubes, Applications of carbon nanotubes.

UNIT-4

Synthesis Of Nanomaterials :Top-down (Nanolithography, CVD), Bottom-up (Sol-get processing, chemical synthesis). Wet Depositiontechniques, Self-assembly (Supramolecular approach), Molecular design and modeling.

UNIT-5

Application: Solar energy conversion and catalysis, Molecular electronics and printed electronics Nanoelectronics, Polymers with a special architecture, Liquid crystalline systems,Linear and nonlinear optical and electrooptical properties, Applications in displays and other devices, Advanced organic materials for data storage, Photonics, Plasmonics, Chemical and biosensors,Nanomedicine and Nanobiotechnology.

SUGGESTED BOOKS & REFERENCE:-

1. Nanotechnology by Richard Booker, Earl Boysen, Wiley Publishing Inc., 2006.
2. Introduction to Nanotechnology by Charles P. Poole Jr., Frank J. Owens, John Wiley & Sons Publications, 2003.
3. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2002

6. VACUUM TECHNOLOGY

UNIT-1

Fundamentals of Vacuum Technology: vacuum nomenclature and definitions, Gas properties, Molecular process and Kinetic theory, Throughput, Pumping speed, Evacuation rate, Outgassing rate, Leak rate, Gas flow, Conductance, Flow calculations.

UNIT-2

Vacuum generation: Diaphragm pump, Rotary pump, Diffusion pump, Cryogenic pump, Turbomolecular pump, Sputter-ion pump and Getter pumps.

UNIT-3

Vacuum Measurement scale, Gauges and Leak detection: U.H.V. techniques, Mass Spectrometer.

UNIT-4

Surface Physics and its Relation to Vacuum Science: Adsorptions, Chemisorptions, Isotherms, Desorptions and Photoactivation.

UNIT-5

Materials for Vacuum tubes, Chemical and Thermal Cleaning. Sputtering Techniques. Brazing. Spot, Arc, Electron beam and Laser weldings. Vacuum and Protected Atmosphere Furnaces. Jigs and Tools. Processing of Electron-Beam Devices.

SUGGESTED BOOKS & REFERENCE:-

1. *Vacuum Science and Technology, V V Rao, T B Ghosh, K L Chopra*
2. *Vacuum Journal, Science direct, Elsevier Publication*

7. OPTIMIZATION TECHNIQUES

UNIT-I

Linear programming - Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.

UNIT-II

Queuing Theory - Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models(Model-I, Model-II).

UNIT-III

Replacement Theory - Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.

UNIT-IV

Inventory Theory - Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite.

UNIT-V

Job Sequencing - Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines

SUGGESTED BOOKS & REFERENCE:-

1. Gillet B.E. "Introduction to Operation Research"
2. Taha,H.A. "Operation Research - an introduction"
3. Kanti Swarup "Operation Research"
4. S.D.Sharma "Operation Research"
5. Hira & Gupta "Operation Research"

8. STOCHASTIC PROCESS

UNIT-I

Probability Theory Refresher: Axiomatic construction of probability spaces, random variables and vectors, probability distributions, functions of random variables; mathematical expectations, transforms and generating functions, modes of convergence of sequences of random variables, laws of large numbers, central limit theorem.

UNIT-II

Introduction to Stochastic Processes (SPs): Definition and examples of SPs, classification of random processes according to state space and parameter space, types of SPs, elementary problems.

UNIT-III

Discrete-time Markov Chains (MCs): Definition and examples of MCs, transition probability matrix, Chapman-Kolmogorov equations; calculation of n-step transition probabilities, limiting probabilities, classification of states, ergodicity, stationary distribution, transient MC; random walk and gambler's ruin problem, applications.
Continuous-time Markov Chains (MCs): Kolmogorov-Feller differential equations, infinitesimal generator, Poisson process, birth-death process, Applications to queueing theory, inventory analysis, communication networks, finance and biology.
Brownian Motion: Wiener process as a limit of random walk; first -passage time and other problems, applications to finance.

UNIT-IV

Branching Processes: Definition and examples branching processes, probability generating function, mean and variance, Galton-Watson branching process, probability of extinction. Renewal Processes: Renewal function and its properties, elementary and key renewal theorems, cost/rewards associated with renewals, Markov renewal and regenerative processes, applications.
Stationary Processes: Weakly stationary and strongly stationary processes, moving average and auto regressive processes.

UNIT-V

Martingales: Conditional expectations, definition and examples of martingales, inequality, convergence andsmoothing properties, applications in finance.

SUGGESTED BOOKS & REFERENCE:-

1. J. Medhi, Stochastic Processes, 3rd Edition, New Age International, 2009.
2. S.M. Ross, Stochastic Processes, 2nd Edition, Wiley, 1996 (WSE Edition).
3. G. R. Grimmett and D. R. Stirzaker, Probability and Random Processes, 3rd Edition, Oxford University Press, 2001.
4. H.M. Taylor and S. Karlin, An Introduction to Stochastic Modeling, 3rd Edition, Academic Press, New York, 1998.