SESSION- 2016-17 BATCH START

CBCS

III SEM. (Split up of Subject areas)

Sl No	Subject Area	Credits
1	HS	3
2	ES	4
3	ES	10
4	PC	10
Semester Credits		27

IV SEM. (Split up of Subject areas)

Sl No	Subject Area	Credits
1	BS	4
2	PC	21
Semester Credits		25

III SEMESTER
B.Tech

S. No	Subject Code	Subjects	Periods/ Week L	T	P	Total Credits
1	EC3THS01	Engineering Economics*	3	0	-	3
2	EC3TPC01	[illegible]	3	1	0	[illegible]
3	EC3TBS01	Engineering Mathematics-II	3	1	-	4
4	EC3TES01	Network Analysis and Synthesis	3	1	-	4
5	EC3TES02	Electronic Devices	3	1	0	4
6	EC3TPC02	[illegible]	3	1	0	4
PRACTICAL						
1	EC3PES02	[illegible]	-	-	3	3
2	EC3PPC02	Digital Logic Circuits*	-	-	3	3
				Total Credits		27

INSTITUTE OF TECHNOLOGY

GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR

SCHEME OF B.Tech.III[rd]SEMESTER (CBCS)

ELECTRONICS & COMMUNICATION ENGINEERING

III[rd]SEMESTER

S. No :	Subject Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1	EC3THS03	Engineering Economics	3	0	0	40	60	100	3
2	EC3TPC01	Signals & Systems	3	1	0	40	60	100	4
3	EC3TBS01	Engineering Mathematics – III	3	1	0	40	60	100	4
4	EC3TES01	Network Analysis And Synthesis	3	1	0	40	60	100	4
5	EC3TES02	Electronic Devices	3	1	0	40	60	100	4
6	EC3TPC02	Digital Logic Circuits	3	1	0	40	60	100	4
7	EC3PES02	Electronic Devices Lab	-	-	3	30	20	50	2
8	EC3PPC02	Digital Logic Circuits Lab	-	-	3	30	20	50	2
			18	5	6	300	400	700	27

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
EC3THS03	3	0		3 hours	40	60	3

ENGINEERING ECONOMICS

Unit 1: Basic Concepts and Definitions, Methodology of Economics, Demand and Supply - elasticity,Theory of the Firm and Market Structure, Price and output determinations in different types of market

Unit 2: Public Sector Economics –Welfare economics, Central and commercial marks and their functions, Industrial policies, theory of localization, weber &surgent Florence theory, investment analysis-NPV, ROI, IRR, Payback period, SWOT analysis.

Unit 3: Monetary and Fiscal Policy:Tools, impact on the economy , Inflation, Business Cycle, Cash Flow-2,3,4 Model.

Unit 4: Business Forecasting – Elementary techniques. Cost and Revenue Analysis, Capital Budget, Break Even Analysis.

Unit5: Indian economy; Urbanization, Unemployment–Poverty, Regional Disparities, Unorganized Sectors- Roll of Plans, Reforms-Post Independent period.

SUGGESTED TEXT BOOKS:-

1. Mankiw Gregory N.(2002), Principles of Economics, Thompson Asia

2. V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill

REFERENCE BOOKS:-

1. Misra, S.K. and Puri (2009), Indian Economy, Himalaya
2. PareekSaroj (2003), Textbook of Business Economics, Sunrise Publishers

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TPC01	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 transforms, 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.

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 TEXT BOOKS:-

1. *Signals and Systems, by Simon Haykin and Barry Van Veen, Wiley, 1999.*
2. *Signal & System, Samarjit Ghosh, TMH.*
3. *Signal & System, P Ramesh Babu, Scitech Publication*

REFERENCE BOOKS:-

1. *Signal & System, A V Oppenheim, PHI*
2. *Signal & System, F Hussain, Umesh Publication*
3. *Schaum's Outline of Signals and Systems – H Hsu, TMH.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TBS01	3	1		3 hours	40	60	4

ENGINEERING 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 TEXT BOOKS:-

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*

REFERENCE BOOKS:-

1. *Louis A Pipes, "Applied Mathematics for Engineers & Physicists", TMH*
2. *R M Rao & A S Bopardikar, "Wavelet Transforms- Introduction to Theory and ApplicationsAdvance Engg. Mathematics"*
3. *Burrus Sidney, R A Gopinath, Guo Haitao, "Introduction to Wavelets and Wavelet Transforms", Printice Hall International.*
4. *Y T Chan, "Wavelet Basics", Kluwer Academic Publishers*
5. *Lokenath Debnath, "Wavelet Transforms and their applications"*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TES01	3	1		3 hours	40	60	4

NETWORK ANALYSIS AND SYNTHESIS

UNIT – I

Review of Circuit concept, 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

UNIT – II

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, 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, Review of Laplace transformations

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 TEXT BOOKS:

1. *M E Valkenburg, "Network Analysis", PHI/Pearson Edu*
2. *Engineering circuit analysis-Hayt and Kimberley, TMH*
3. *A Chakraborty, "Circuit Theory Analysis & Synthesis", Dhanpat Rai & Co.*

REFERENCES BOOKS

1. *Network Theory- D. Roy Chaudhary, Newage Asian*
2. *Electric Circuit Analysis-Alexender and Sadique, TMH*
3. *Engineering circuit analysis-Hayt and Kimberley, TMH*
4. *A Sudhakar & Shyam Mohan S Palli, "Circuits and Networks:Analysis & Synthesis", TMH*

5. *Samarjit Ghosh. "Network Theory Analysis & Synthesis". PHI*
6. *T Lapatra. "Network Synthesis". TMH*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TES02	3	1		3 hours	40	60	4

ELECTRONIC DEVICES

UNIT – I

Review of Semiconductor concept, Transport Phenomena of semiconductor, Charge density in Semiconductor, Hall Effect, Injected minority charge carriers, Potential variation within graded semiconductor, Junction Diode Characteristics, Current component of PN 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, 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, Stability factor- Stabilization against variation in 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 TEXT BOOKS:-

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*

REFERENCE BOOKS:-

1. *Microelectronics – Millman and Grabel, TMH*
2. *Microelectronics circuits-Sedra/Smith, Oxford University Press*
3. *Electronic Devices & Circuit Analysis- K Lal Kishore, BS Publicatons*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC3TPC02	3	1	0	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 TEXT BOOKS:

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*

REFERENCE BOOKS:

1. *An Engineering Approach to Digital Design, W. Fletcher, PHI Edition*
2. *Floyed & Jain, "Digital Fundamentals", Pearson Edu*

3. *A P Malvino, "Digital Electronics" TMH*
4. *A Lee, "Digital Circuits & Logic Design", PHI*
5. *Fundamentals of Digital Logic with Verilog Design, S. Brown and Z. Vranesic, TMH*
6. *Digital System Design using VHDL, C. H. Roth, Thompson Publications*

SESSION 2016-17 BATCH START

CBCS

IV SEMESTER
B.Tech

S. No.	Subject Code	Subjects	Periods / Week L	T	P	Total Credit
1	EC4TBS02	Numerical Analysis	3	1	0	4
2	EC4TPC03	Linear Control Systems	3	1	0	4
3	EC4TPC04	Analog Circuits	3	1	0	4
4	EC4TPC05	Communication Systems	3	1	0	4
5	EC4TPC06	Electronic Measurements & Instrumentation	3	0	0	3
PRACTICAL						
1	EC4PPC04	Analog Circuits	0	0	3	2
2	EC4PPC05	Communication Systems	-	-	3	2
3	EC4PPC06	Electronic Measurements & Instrumentation	0	0	3	2
				Total Credits		25

INSTITUTE OF TECHNOLOGY

GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR

SCHEME OF B.Tech. IVth SEMESTER (CBCS)

ELECTRONICS & COMMUNICATION ENGINEERING

S. No :	Subject Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	EC4TBS02	Numerical Analysis	3	1	0	40	60	100	4
2.	EC4TPC03	Automatic Control Systems	3	1	0	40	60	100	4
3.	EC4TPC04	Analog Circuits	3	1	0	40	60	100	4
4.	EC4TPC05	Communication System-I	3	1	0	40	60	100	4
5.	EC4TPC06	Electronic Measurements & Instrumentation	3	0	0	40	60	100	3
6.	EC4PPC04	Analog Circuits Lab	0	0	3	30	20	50	2
7.	EC4PPC05	Communication System-I Lab	0	0	3	30	20	50	2
8.	EC4PPC06	Electronic Measurements & Instrumentation Lab	0	0	3	30	20	50	2
			15	5	9	290	360	650	25

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TBS02	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, Fitting 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 TEXT BOOKS:-

1. *Jain & Iyngar, Numerical Methods for Scientific and Engineering Computations.*
2. *G S Rao, Numerical Analysis.*

REFERENCE BOOKS:

1. *B S Grewal, Numerical Mrthods in Engineering Science.*
2. *K K Das, Advance Engineering Methods.*
3. *V Rajaraman, Computer Oriented Numerical Methods.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TPC03	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..

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 TEXT BOOKS:-

1. *"Modern Control Engineering", Ogata, Pearson Education.*
2. *"Control System Engineering", M Gopal, New Age International.*
3. *"Automatic Control System" B.C. Kuo, PHI*
4. *"Linear Control System", B.S.Manke, Khanna Pub.*

REFERENCE BOOKS:-

1. *"Modern Control System", R.C. Dorf & R.N.Bishop, AWL Low price edition.*
2. *"Introduction to Control Engineering", Ajit K.Mandal, New Age International.*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TPC04	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.

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.

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 Aniplifiers, Cross-over Distortion.

UNIT – V

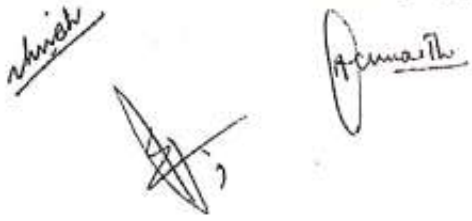
Oscillator: Sinusoidal oscillator, Phase shift oscillator, Wien bridge oscillator, Resonant circuit oscillators: LC Collpit, LC Hartley, Amplitude, Frequency and Phase stability Analysis of all oscillators, General form of oscillator configuration: Crystal oscillator, Tuned Amplifiers: Classification of tuned Amplifier, Analysis of single and double tuned amplifiers, Stagger tuned amplifier

SUGGESTED TEXT BOOKS:-

1. *Integrated Electronics, Millman & Halkias, TMH*
2. *Microelectronics, Millman & Grabel, TMH*

REFERENCE BOOKS:-

1. *Electronic Device & Circuits, David A Bell, PHI*
2. *Electronic Device & Circuit Theory, Boylestad & Nashelsky, PHI*



Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TPC05	3	1		3 hours	40	60	4

COMMUNICATION SYSTEM – I

UNIT – I

Random Variables & Processes: Probability, Random Variables, Cumulative Distribution Function, Probability density function, 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 A DSB signal, 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 TEXT BOOKS:-

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.*

REFERENCE BOOKS:-

1. *Communication System", R P Singh & S D Sapre . TMH*
2. *" Modern Analog and Digital Communication",B.P Lathi 3rd edition, Oxford Press*

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC4TPC06	3	0	0	3 hours	40	60	3

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

UNIT – I

Measurements, Significance of measurement, Methods of measurement, Instruments and measurement system, Classification of Instruments, Mode of Operation, Application of measurement system, Characteristics of instrument and measurement system; Elements of a Generalized Measurement System, Accuracy and precision, Significant figure, types of error, Probability of 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, 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, 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, Block diagram, CRT, Functional block diagram of sampling, Storage, Dual trace and dual beam oscilloscope.

SUGGESTED TEXT BOOKS:-

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*

V SEM. (Split up of Subject areas)

Sl No	Subject Area	Credits
1	**PC**	**16**
2	**PE**	**8**
	OE	**3**
Semester Credits		***27***

VI SEM. (Split up of Subject areas)

Sl No	Subject Area	Credits
1	**PC**	**10**
2	**PE**	**8**
3	**OE**	**3**
4	SEMINAR	**2**
Semester Credits		***23***

V SEMESTER B.Tech

S. No.	Subject Code	Subjects	Periods / Week			Total Credit
			L[1]	**T[2]**	**P[3]**	
1	**EC5TPC07**	LIC & ITS APPLICATION	3	1	0	4
2	**EC5TPC08**	CS-II	3	1	0	4
3	**EC5TPC09**	EMFT	3	1	0	4
4	**EC5TPE01**	Microprocessor & Its Application	3	0	0	3
5	**EC5TPE02**	DS&OS	3	0	0	3
6	**EC5TOE11-EC5TOE15**	1. Computer Architecture, 2.OOP in C++, 3.Introduction to Information Security, 4.Project Management, 5. Rural Technology and Community Development	3	0	0	3
PRACTICAL						
1	**EC5PPC07**	LIC & ITS APPLICATION	-	-	3	2
2	**EC5PPE01**	Microprocessor & Its Application	-	-	3	2
3	**EC5PPC08**	CS-II	-	-	3	2
				Total Credits		**27**

VI SEMESTER B.Tech						
S. No.	Subject Code	Subjects	Periods / Week			Total Credit
			L[1]	**T[2]**	**P[3]**	
1	**EC6TPC10**	DSP	3	1	0	4
2	**EC6TPC11**	Antenna & wave prapogation	3	1	0	4
3	**EC6TPE03**	Data Communication & Computer Networking	3	0	0	3
4	**EC6TPE04**	Fundamental of VLSI Design	3	0	0	3
5	**EC6TOE21-25**	1.UNIX, Operating System 2. Probability & Stochastic tProcess 3. Advanced Instrumentation, 4. Knowledge management, 5. Engineering System Design Optimization,	3	0	0	3
PRACTICAL						
1	**EC6PPE02**	VHDL	-	-	3	2
2	**EC6PPC06**	DSP	-	-	3	2
3	**EC6PSP01**	SEMINAR				2
				Total credit		**23**

INSTITUTE OF TECHNOLOGY

GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR

SCHEME OF B.Tech. V^{rh} SEMESTER (CBCS)

ELECTRONICS & COMMUNICATION ENGINEERING

Vth SEMESTER

S. No :	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	EC5TPC07	LIC & its Application	3	1		40	60	100	4
2.	EC5TPC08	Communication System – II	3	1		40	60	100	4
3.	EC5TPC09	Electromagnetic Field Theory	3	1		40	60	100	4
4.	EC5TPE01	Microprocessor & Its Applications	3			40	60	100	3
5.	EC5TPE02	DS & OS	3			40	60	100	3
6.	EC5TOE11 - EC5TOE15	Open Elective	3			40	60	100	3
7.	EC5PPC07	LIC & its Application Lab			3	30	20	50	2
8.	EC5PPE01	Microprocessors & Its Applications Lab			3	30	20	50	2
9.	EC5PPC08	Communication System –II Lab			3	30	20	50	2
			18	**3**	**9**	**330**	**420**	**750**	**27**

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
EC5TPC07	3	1		3 hours	40	60	4

Course Objective

1. To understand the concepts, working principles and key applications of linear integrated circuits.
2. To perform analysis of circuits based on linear integrated circuits
3. To design circuits and systems for particular applications using linear integrated circuits.

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*
6. *Microelectronic Circuits: Theory and Applications (International Version), OXFORD University Press*

Course Outcomes:

After the completion of this course student will

1. Understand the fundamentals and areas of applications for the integrated circuits.
2. Analyze important types of integrated circuits.
3. Demonstrate the ability to design practical circuits that perform the desired operations.
4. Understand the differences between theoretical, practical & simulated results in integrated circuits.
5. Select the appropriate integrated circuit modules to build a given application

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TPC08	3	1		3 hours	40	60	4

Course Objectives:

- To understand the key modules of digital communication systems with emphasis on digital modulation techniques.
- To get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding.

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.

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. Principles of Digital Communications, Das, Mullick and Chatterjee, Wiley Eastern Publications.
5.Digital and Analog Communication Systems: K.Sam Shanmugam, John Wiley
6. Microelectronic Circuits: Sedra and Smith 6th edition, Oxford University Press.

Course outcomes:

1) To familiar with the concept of digital communication.
2) To learn different digital modulation like PCM, DM, ADM including pulse modulation like PAM, PPM and also Time Division Multiplexing.
3) To learn different digital modulation techniques.
4) To introduce the concept of optimal reception of digital signal.
5) To familiar with the concept of information theory and also different coding scheme.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TPC09	3	1		3 hours	40	60	4

Course objective

1. To acquire the knowledge of Electromagnetic field theory that allows the student to have a solid theoretical foundation to be able in the future to design emission, propagation and reception of electro- magnetic wave systems
2. To identify, formulate and solve fields and electromagnetic waves propagation problems in a multidisciplinary frame individually.
3. To provide the students with a solid foundation in engineering fundamentals required to solve problems and also to pursue higher studies

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.

Course outcomes:

1) To introduce the basic mathematical concepts related to electromagnetic vector fields.
2) To impart knowledge on the concepts of
   Electrostatic fields, electrical potential, energy density and their applications.
   Magneto static fields, magnetic flux density, vector potential and its applications.
   Different methods of emf generation and Maxwell's equations
   Electromagnetic waves and characterizing parameters
3) To introduce the concept of high frequency wave behaviour.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TPE01	3	0		3 hours	40	60	3

Course Objective

1. Introduce the concept of microprocessor and its history and evolution with integration technology.
2. Introduce the concept of interfacing and also assembly language programming in 8085 and 8086.
3. Introduce the concept of architecture of microprocessor.

MICROPROCESSOR & ITS APPLICATION

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. *"Advance Microprocessor & Peripherals", A K Rai , K M Bhurchandi, TMH*
3. *"The Intel Microprocessor", Barray B. Brey, PHI*

Subject outcomes:

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

1) Describe the general architecture of a microcomputer system and architecture &organization of 8085 & 8086 Microprocessor.
2) Understand and realize the Interfacing of memory & various I/O devices with 8085 microprocessor.
3) Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.
4) Understand the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessors

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TPE02	3	0		3 hours	40	60	3

Course Objective:

1. To introduce the concept of Data Structure.
2. To introduce operating system as a resource manager, its evolutions and fundamentals.
3. To help student understand concept of process and different process (linear and concurrent) Scheduling policies.
4. To help student familiar with memory, file and I/O management policies.

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, **Stack:** Basic Operation, Conversion of infix notation using
stack, evaluation of postfix expression, recursion, **Queue:** Basic Operation, Circular & Linear Queue.

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.*

Subject outcomes:

1) To Learn linear data structures – lists, stacks, and queues
2) To understand sorting, searching and different algorithms
3) To apply Tree and Graph structures

And also familiar with the operating system and memory concept and process management.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TOE11	3	0		3 hours	40	60	3

Course Objective

1.Discuss the basic concepts and structure of computers
2. Understand concepts of register transfer logic and arithmetic operation
3. Explain different types of addressing modes and memory organization.
4. Learn the concept of pipeline architecture.
5. Summarize the Instruction execution stages.

COMPUTER ARCHITECTURE

UNIT-I

Basic of Computer Organization & Architecture: Introduction, Computer Organization vs. Computer architecture, Von Neumann Architecture vs. Harvard Architecture, Introduction to Simple as Possible (SAP) Computer Architecture.

Input & Output Organization: Introduction, Simple Bus Architecture, Types of Buses, I/O Communication Methodologies: Programmed I/O (Polling), Interrupt-driven I/O &Direct Memory Access (DMA), I/O channel & I/O Processor, Accessing I/O device: Memory Mapped I/O, Isolated or I/O Mapped.

UNIT-II

Computer Arithmetic: Introduction, Addition & Subtraction: Addition & Subtraction with Signed-Magnitude Data, Hardware Implementation & Algorithm, Addition & Subtraction with Signed-2's Complement Data, Multiplication Algorithm: Hardware Implementation for Signed-Magnitude Data, Hardware Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithms: Hardware Implementation for Signed-Magnitude Data& Algorithm , Carry Look Ahead Adder.

UNIT-III

Memory Organization: Introduction, Types of Memory, Memory Hierarchy, Main Memory, Cache Memory, Virtual Memory, Associative Memory.

Processor Organization: Introduction, Control Unit: Hardwired Control Unit, Micro programmed Control Unit, Instruction Set Computer: Reduced Instruction Set Computer (RISC) vs. Complex Instruction Set Computer (CISC).

UNIT-IV

Pipelining: Introduction, Concept of Instruction Pipeline, Design Problems with Pipeline: Structural Hazard, Data Hazard & Control Hazard, Extension in Pipeline Designed: Super Pipelining, Superscalar Processor, Very Long Instruction Width (VLIW) Architecture.

UNIT-V

Multiprocessor System: Introduction, Shared Memory Multiprocessor, Distributed Memory Multiprocessor, Flynn's Classification: Single Instruction Single Data (SISD), Single Instruction Multiple Data (SIMD), Multiple Instruction Single Data (MISD), Multiple Instruction Multiple Data (MIMD), Cache Coherence, Message Passing Model, Cluster Computing, Distributed Computing.

SUGGESTED BOOKS & REFERENCE:-

1. *Computer System Architecture, M. Morris Mano, Pearson Education India.*
2. *Computer Organization & Architecture, W. Stalling, Pearson Education India.*

3. *Computer Architecture & Organization, J. P. Hayes, McGraw-Hill India.*
4. *Digital Computer Electronics,Malvino,Tata McGraw-Hill India.*
5. *Computer System Organization, NareshJotwani, McGraw Hill, India.*
6. *Computer System Architecture, P. V. S. Rao, PHI India.*
7. *Advanced Computer Architecture, Rajiv Chopra, S. Chand India.*
8. *Computer Organization & Architecture, Lalit K. Arora, Anjali Arora, S. K. Kataria& Sons, India.*
9. *Computer Fundamentals Architecture & Organization, B Ram, Sanjay Kumar, New Age International, India.*

Subject outcomes:

1) To learn the basic structure and operations of a computer based system
2) To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
3) To learn the basics of pipelined execution.
4) To understand parallelism and multi-core processors.
5) To understand the memory hierarchies, cache memories and virtual memories.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TOE12	3	0		3 hours	40	60	3

Course Objective

1. To learn advanced features of the C++ programming language as a continuation of the previous course.
2. To learn the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods.
3. To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managing complexity.
4. To enhance problem solving and programming skills in C++ with extensive programming projects.

OBJECT ORIENTED PROGRAMMING IN C++

UNIT I

Principles of OOP –A look at procedure oriented programming, OOP paradigm, Basic Concepts of OOPs, Benefits of OOP, object oriented Language. Beginning with C^{++} characters used in C^{++}, Basic Data Types , C^{++} Tokens, Identifiers , Keywords , Constants , Variables , Input / Output statements ,Structure of C^{++} program.

UNIT II

Operations and Expressions - Concept, Arithmetic Operations and Expressions, Relational and Logical operators and Expressions ,Order of evaluation of expressions ,Type conversion , Compound assignment Operator ,Standard Library Functions and header files. Flow of control – Compound statement , sequential structure ,selection structure ,simple if ,if … else nested if , ladder ,switch , go to , loop structure , do … while ,for , statement break , continue , function exit ( )

UNIT III

Array and Function - Concept of array, Concept of subprogram, Parameter passing in function, Function prototype, Calling function, Call by value, Call by reference, Array parameters, Default argument, Returning values, Scope rules, Storage class, Inline function, Function overloading, Recursive functions. Structure, Class and Object - Define structure, Returning structure elements, Nested structure, Passing structure to function, User defined data type, Specifying a class, Defining member function, Scope of class and its member, Nested class, Data Hiding and encapsulation, Friend function, Object as function argument, Function returning object, Static member.

UNIT IV

Constructors, Destructors, constructor function, parameterized multiple constructor, Default constructor, Copy constructor and Destructor function. Inheritance and aggregation - Derived class, various type of inheritance, Inheriting Constructors, Parts explosion as aggregation, Abstraction and property of aggregation, Constructing aggregations. Polymorphism, overloading and operator overloading.

UNIT V

Pointer and virtual function - Pointer variable, dynamic allocation operators, new and delete, this operator Pointers to derived class, Working with files - File & stream, Opening and closing a file, read( ) and write( ) functions, detecting end of file.

SUGGESTED BOOKS & REFERENCE:-

1.Object Oriented Programming With C++ by M. P. Bhave S. A. Patekar, Pearson Education
2.Object Oriented Programming With C++ by E. Balaguruswamy.
3.Object Oriented Programming in turbo C++ by Robert Lafore.
4.Programming with C++ by D. Ravichandan.
5.Programming with C++(SOS) by Hubbard.

Course outcome:

- To understand Object Oriented Programming concepts and basic characteristics using C++.
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To design and build simple Graphical User Interfaces

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TOE13	3	0		3 hours	40	60	3

Course Objective

This course focuses on the models, tools, and techniques for enforcement of information security with some emphasis on the use of cryptography. Students will learn information security from multiple perspectives

INTRODUCTION TO INFORMATION 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.*

Course outcomes:

1. Identify computer and network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks.
2. Develop SSL or Firewall based solutions against security threats, employ access control techniques to the existing computer platforms such as Unix and Windows NT.
3. Identify factors driving the need for information security

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TOE14	3	0		3 hours	40	60	3

Course Objective

1. To make them understand the concepts of Project Management for planning to execution of projects.
2. To make them understand the feasibility analysis in Project Management and network analysis tools for cost and time estimation.
3. To enable them to comprehend the fundamentals of Contract Administration, Costing and Budgeting.
4. Make them capable to analyze, apply and appreciate contemporary project management tools and methodologies .

PROJECT MANAGEMENT

UNIT-I, ***Basics of Project Management:*** Introduction, Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Management Processes, Project Management Principles

UNIT-II, ***Project Identification and Selection:*** Introduction, Project Identification Process, Project Initiation, Pre-Feasibility Study, Feasibility Studies, Project Break-even point

Project Planning: Introduction, Project Planning, Need of Project Planning, Project Life Cycle, Roles, Responsibility and Team Work, Project Planning Process, Work Breakdown Structure (WBS)

UNIT-III, ***Resources Considerations in Projects:*** Introduction, Resource Allocation, Scheduling, Project Cost Estimate and Budgets, Cost Forecasts

PERT and CPM: Introduction, Development of Project Network, Time Estimation, Determination of the Critical Path, PERT Model, Measures of variability, CPM Model, Network Cost System

UNIT-IV, ***Project Management Information System:*** Introduction, Project Management Information System (PMIS), Planning of PMIS, Design of PMIS

Project Management Software: Introduction, Advantages of Using Project Management Software, Common Features Available In Most of the Project Management Software.

UNIT-V, ***Post-Project Analysis:*** Project review and control- Initial review, performance evaluation, abandonment analysis and its behavioral issues.

SUGGESTED BOOKS & REFERENCE:-

1. Shtub, Bard and Globerson, Project Management: Engineering, Technology, and Implementation, PHI
2. Lock, Gower, Project Management Handbook.
3. Cleland and King, VNR Project Management Handbook.
4. Wiest and Levy, Management guide to PERT/CPM, Prentice Hall. Ibdia
5. Horald Kerzner, Project Management: A Systemic Approach to Planning, Scheduling and Controlling, CBS Publishers, 2002.
6. S. Choudhury, Project Scheduling and Monitoring in Practice.
7. P. K. Joy, Total Project Management: The Indian Context, Macmillan India Ltd.
8. Project planning, analysis, selection, implementation and review by Prasanna Chandra, TMH.

Course outcomes

- This course focuses on project management methodology that will allow students to initiate and manage projects efficiently and effectively. Student will learn key project management skills and strategies, and they will have the opportunity to apply this knowledge through assignments.
- Upon completion of the course, students will be able to:
- Understand project management design, development, and deployment
- Use project management tools, techniques, and skills
- Employ strategies to address the ubiquitous issue of resistance to change
- Align critical resources for effective project implementation
- Understand the implications, challenges, and opportunities of organizational dynamics in project management
- Identify and use key performance metrics for project success
- Understand how to manage project cost, quality, and delivery
- Engage and lead effective project management teams in your organization
- Impart project management knowledge, tools, and processes to your colleagues
- Recognize and mitigate the early seeds of failure in the project life cycle

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC5TOE15	3	0		3 hours	40	60	3

Course Objective:

Objective of this subject is to introduce the concept of Rural development and community development in aspect of technology.

RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

Unit- 1: PMGDISHA, digital literacy program, role of electronics in cashless rural economy, constraint in digitalization of rural areas, problems in community networking.

Unit- 2: Data, Information and Knowledge; concept of information, need of information (professional, educational, research), qualities of information, value of information, difference between data and information, properties of the needed information. Information and Management; planning, organizing, co-ordinating and controlling,

Unit- 3: Concepts of rural marketing; difference between rural and urban marketing, selling and retailing; marketing mix, market-segmentation, marketing planning, Strategy and Approaches; modern concept of marketing.

Unit- 4: Community development; concept, definition, meaning, need, history, principles, objectives and scope. Critical analysis of different rural development program organized by government of INDIA. PRA and RRA for problem analysis of villages .

Unit-5: Strategies for enhancing rural infrastructures. The Role of various NGOs in Community Development. Community Development Initiatives.

SUGGESTED BOOKS & REFERENCE: -

1. *Biddle, William Wishart. 1968. Encouraging Community Development: A Training Guide for Local Workers. New York: Holt, Rinehart and Winston.*

2. Kramer, Ralph M. and Harry Specht. 1975. Readings in Community Organization Practice. 2d ed. Englewood Cliffs, NJ: Prentice-Hall.

3. Sustainable Rural Technology, by M.S. Virdi, Daya Publishing House, ISBN: 8170355656

4. Rural Education and Technology, by S B Verma S K Jiloka Kannaki Das, Publisher: Deep & Deep Publications Pvt. Ltd. (2006)

5. Participatory Rural Appraisal. By Neela Mukharjee, Concept Publisher New Delhi.

6. India's developing villages. By G.R. Madan, Kalyani Publication, New Delhi.

Subject outcomes:

1. Understanding the concepts of Development
2. Theories of development in the context of Rural Development.
3. Indicators of Development &Rural Development and their measurements.
4. Recent advancement in Rural Development Theories.
5. Concept of sustainable rural development

INSTITUTE OF TECHNOLOGY

GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR

SCHEME OF B.Tech. VIth SEMESTER (CBCS)

ELECTRONICS & COMMUNICATION ENGINEERING

VIth SEMESTER

S. No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	EC6TPC10	**Digital Signal Processing**	3	1		40	60	100	4
2.	EC6TPC11	**Antenna & Wave Propagation**	3	1		40	60	100	4
3.	EC6TPE03	**Data Communication & Computer Networking**	3			40	60	100	3
4.	EC6TPE04	**Fundamental of VLSI Design**	3			40	60	100	3
5.	EC6TOE21 - 25	**Open Elective**	3			40	60	100	3
6.	EC6PPE02	**VHDL Lab**			3	30	20	50	2
7.	EC6PPC06	**Digital Signal Processing Lab**			3	30	20	50	2
8.	EC6PSP01	**Seminar**				30	20	50	2
			15	**2**	**6**	**290**	**360**	**650**	**23**

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
EC6TPC10	3	1		3 hours	40	60	4

Course objective

The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis of DSP systems.

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. Simple Structures of decimator and interpolator. 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.*

Course outcomes:

1) This course introduces the concept of digital signal processing.
2) The course content includes the concept and the classification of discrete-time signal, representations of signals in time, frequency, z- and discrete frequency domains, representations and analyses of systems, and filter designs and also the application of DSP.
3) The course is a prerequisite course for further studying of other multimedia related courses, such as speech processing, image processing, audio and video data compressing, pattern recognition, communication systems and so forth.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TPC11	3	1		3 hours	40	60	4

Course Objective:

The main objective of the course of determination of the fields radiated from antennas; wire antennas; array antennas; parabolic reflectors; antenna radiation pattern; antenna directivity; effects of the lossy ground on the wave propagation.

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

Course outcome:

- To give insight of the radiation phenomena.
- To give a thorough understanding of the radiation characteristics of different types of antennas.
- To introduce the basic concept of antenna, array and design.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TPE03	3	0		3 hours	40	60	3

Course objective

1. To introduce analysis and design concept of computer and communication networks.
2. To understand the network layered architecture and the protocol stack.

DATA COMMUNICATION AND COMPUTER NETWORKING

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

Application 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; Tata Mcgraa Hill.*
3. *Data Networks, Dimitri P. Bertsekas,Robert G. Gallager,Prentice-Hall*
4. *Data and Computer Communications, William Stallings, pearson edition.*

Course outcomes:

This course teaches the design and implementation techniques essential for engineering robust networks. Topics include networking principles, Transmission Control Protocol/Internet Protocol, naming and addressing (Domain Name System), data encoding/decoding techniques, link layer protocols, routing protocols, transport layer services, congestion control, quality of service, network services, Software Defined Networks (SDNs), programmable routers and overlay networks, wireless and mobile networking, security in computer networks, multimedia networking, and network management.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TPE04	3	0		3 hours	40	60	3

Subject Objective

1.To understand the fabrication process of CMOS technology
2. To teach fundamentals of VLSI circuit design and implementation using circuit simulators and layout editors.
3. To study various problems due to VLSI technology advancement.
4. To study digital circuits using various logic methods and their limitations.
5. To highlight the circuit design issues in the context of VLSI technology.

Fundamental of VLSI Design

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.

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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.
7. Introduction to VLSI Circuits and Systems, John.T.Uyemura, Wiley India.

Course outcomes:

1) To introduce the concept of VLSI.
2) To introduce the concept of MOS fabrication, MOS design and different MOS circuits.
3) To introduce the concept of VHDL.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE21	3	0		3 hours	40	60	3

Course outcomes:

Objective of this subject to familiarizes the students with concept, design and structure of UNIX operating system and also learn the file management.

UNIX Operating System

UNIT-I

The Operating System, The UNIX Operating System, Knowing Your Machine, A Brief Session [Logging in with Username and Password, The Command, Displaying Both Date and Time, Clearing the Screen, The Calendar, Viewing Processes, Listing Files, Directing Output to a File, Counting Number of Lines in a File].

UNIT-II

The UNIX Architecture [Division of Labor : Kernel and Shell, The File and Process, The System Calls], Features of UNIX [Multiuser System, Multitasking System, Building Block Approach, UNIX Toolkit, Pattern Matching, Programming Facility, Documentation], Locating Commands [The PATH], Internal and External Commands, Command Structure [Options, Filename Arguments, Exceptions], Flexibility of Usage, Browsing the Manual Pages [man].

UNIT-III

General Purpose Utilities [The Calendar, Displaying The System Date, Displaying A Message, An Alternative To Echo, The Calculator, Recording Your Session, Email Basics, The Universal Mailer, Changing Your Password, Who, Uname, Tty, Stty, Changing The Settings]

UNIT-IV

The File [Ordinary, Directory, Device], The Parent Child Relationship, The Home Directory, Checking Your Current Directory, Changing The Current Directory, Making Directories, Removing Directories, Absolute Path Names, Relative Pathnames, Listing Directory Contents.

UNIT-V

Displaying And Creating Files, Copying A File, Deleting Files, Renaming Files, Paging Output, Printing A File, Knowing The File Types, Counting Lines/Words/Characters, Displaying Data In Octal, Comparing Two Files, Comm, Converting One File To Other, Compressing And Archiving Files, Compressing And Decompressing Files

SUGGESTED BOOKS & REFERENCE:-

1. *S. Das, UNIX CONCEPTS AND APPLICATIONS, TMH.*
2. *H. Hahn, HARLEY HAHN'S STUDENT GUIDE TO UNIX, McGraw Hill Companies.*
3. *S.M. Sarwar, R. Korektsy AND S.A. Sarwar, UNIX : THE TEXTBOOK, Addison-Wesley Longman.*

Course outcomes:

1) Explain basic unix concepts related to concurrency and control of programs and Identify and define key terms related to operating system
2) Capability to name and state the function of unix commands.
3) To introduce the concept of operating system.
4) To introduce the concept of file management including display, create and copy a file.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE22	3	0		3 hours	40	60	3

Course Objective

The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.

Probability & 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.

Course outcomes:

- Learn the language and core concepts of probability theory.
- Understand basic principles of statistical inference.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE23	3	0		3 hours	40	60	3

Course objective

1 .To familiarizes the student with general concept of instrumentation and measurement.
2. To introduce the concept of Temperature and flow measurement**.**

ADVANCED INSTRUMENTATION

UNIT – I

Generalized Performance Characteristics of Instruments-I: Static Characteristics and static calibration, Measured Value and True Value, Some Basic Statistics, Least Square calibration Curves, 2-σ limits in defining imprecision, Chi-square test, Calibration Accuracy and Installed accuracy, Static sensitivity, Linearity, Threshold, Noise Floor, Resolution, Hysteresis, Dead Space, Span, Loading Effect.

UNIT – II

Generalized Performance Characteristics of Instruments-II: Dynamic Characteristics, Generalized model of measurement system, Digital simulation method, Operational Transfer Function, Sinusoidal Transfer Function, Zero order instrument.

UNIT – III

Generalized Performance Characteristics of Instruments-III: 1^{st} order instrument - Step Response, Frequency Response, Impulse Response, 2^{nd} order instruments - Step Response, Frequency Response, Impulse Response, Loading effect under dynamic conditions.

UNIT – IV

Temperature Measurement: Thermal Expansion Method, Thermo-electric Sensors, Electrical Resistance Sensors, Junction Semiconductor Sensors, Digital Thermometers, Radiation Methods.

UNIT – V

Flow Measurement: Flow visualization, Pitot-Static Tube, Dynamic Wind-Vector Indicator, Hot-Wire and Hot-Film Anemometers, Hot-Film Shock-Tube Velocity Sensor.

SUGGESTED BOOKS & REFERENCE:-

1.Measurement Systems, Ernest O Doebelin & Dhanesh N Manik, Mc Graw Hill publication
2.Electronic Instrumentation, 3edition by H. S. Kalsi Tata Mc Graw Hill publication
3. A Course in Electronic Measurements and Instrumentation, A.K.Sahani, Dhanpat Rai & Sons

Subject outcome:

1) Understand the calibration of various analytical instruments
2) Know analysis of using various analytical instruments.
3) To learn the concept of temperature and flow measurement.
4) To learn the general concept of instrument handling performance and behavior analysis.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE24	3	0		3 hours	40	60	3

Course Objective

1. Promoting enhanced knowledge dissemination within the organization with the help of internal as well as external learning processes and systems.
2. Transforming individual knowledge into the structural capital of the enterprise and organization.
3. Aligning business strategy with the existing core competencies of the organization and its capabilities.

Knowledge Management

Unit 1: Introduction: Definition, evolution, need, drivers, scope, approaches in Organizations, strategies in organizations, components and functions, understanding knowledge; Learning organization: five components of learning organization, knowledge sources, and documentation.

Unit 2: Essentials of Knowledge Management; knowledge creation process, knowledge management techniques, systems and tools.

Unit 3: Organizational knowledge management; architecture and implementation strategies, building the knowledge corporation and implementing knowledge management in organization.

Unit 4: Knowledge management system life cycle, managing knowledge workers,knowledge audit, and knowledge management practices in organizations, few case studies.

Unit 5: Futuristic KM: Knowledge Engineering, Theory of Computation, Data Structure.

SUGGESTED BOOKS & REFERENCE:-

1. Knowledge Management – a resource book – A Thohothathri Raman, Excel, 2004.
2. Knowledge Management- Elias M. Awad Hasan M. Ghazri, Pearson Education
3. The KM Toolkit – Orchestrating IT, Strategy & Knowledge Platforms, Amrit Tiwana, Pearson, PHI, II Edn.
4.The Fifth Discipline Field Book – Strategies & Tools For Building A learning Organization – PeterSenge et al. Nicholas Brealey 1994
5. Knowledge Management – Sudhir Warier, Vikas publications
6. Leading with Knowledge, Madanmohan Rao, Tata Mc-Graw Hill.

Subject outcomes:

1) Knowledge creation at the level of the individual, group and organization.
2)The nature of technical problem-solving o Formulating knowledge
3) Explicit and codified knowledge
4) Tacit, implicit and sticky knowledge.
5) Technological versus pre-technological knowledge

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE25	3	0		3 hours	40	60	3

Course Objective

Objective of this course to introduce

1. the multidisciplinary character of engineering systems,
2 design of these complex systems, and
3. Introduce the various concept of optimization.

Engineering System Design Optimization

Unit1: Introduction- Optimization problem formulation, optimization algorithms, applications and examples, different optimization methods available.

Unit 2: Single Variable optimization-Optimization criteria, bracketing methods – Exhaustive search method, bound phase method; Region Elimination methods – Fibonacci search method, Golden search method; Gradient based methods – Newton Raphson method, Bisection method; Root finding using optimization technique.

Unit 3: Multi objective optimization- Optimization criteria, Different search methods, Unidirectional search, Direct search method – Evolutionary optimization method, Powell‟s 74 conjugate direction method; Gradient based methods – Newton‟s method and Variable metric method.

Unit 4: Specialized Methods- Integer programming, Geometric programming, simulated annealing, Global optimization using - steep descent method, simulated annealing.

Unit 5: Genetic algorithms and evolutionary approaches-Differences and similarities between genetic algorithms and traditional techniques, operators of GA‟s, Computer program for simulated annealing, Newton Raphson method, Evolutionary optimization method.

SUGGESTED BOOKS & REFERENCE:-

1. *Kalyanmoy Deb, "Optimization for Engineering design", Prentice Hall, India, 2005.*
2. *Kalyanmoy Deb, "Multi objective optimization using Evolutionary algorithms", John Wiley, 2001.*
3. *Taha, Operations Research, TMH 2010*

Subject outcomes:

1. Engineering systems modeling for design and optimization.
2. Selection of design variables, objective functions and constraints.
3. Overview of principles, methods and tools in multidisciplinary design optimization (MDO) for systems.
4. Subsystem identification, development and interface design.
5. Review of linear and non-linear constrained optimization formulations.

ELECTRONICS & COMMUNICATION ENGINEERING Effective From 2018-19 (CBCS)

VII SEM. (Split up of Subject areas)

Sl No	Subject Area	Credits
1	**PC**	**10**
2	**PE**	**6**
3	**OE**	**3**
4	**Comphrensive Viva**	**2**
-	**Project -I**	**3**
Semester Credits		***24***

VIII SEM. (Split up of Subject areas)

Sl No	Subject Area	Credits
1	**PC**	**12**
2	**PE**	**3**
3	**OE**	**3**
4	Comprehensive Viva	**2**
5	Project-II	**4**
Semester Credits		***24***

VII SEMESTER B.Tech

S. No.	Subject Code	Subjects	Periods / Week			Total Credit
			L[1]	**T[2]**	**P[3]**	
1	**EC7TPC12**	Microwave Engineering	3	1	0	4
2	**EC7TPC13**	WMC	3	1	0	4
3	**EC7TPE05**	AHD	3		0	3
4	**EC7TPE06**	PE	3	0	0	3
5	**EC7TOE31-EC5TOE35**	1 Wireless sensor network 2 Information theory and coding 3.Nanotechnology 4.Optical instrumentation and measurement, 5. Neural network and fuzzy logic	3	0	0	3
PRACTICAL						
1	**EC7PPC12**	Microwave Engineering	-	-	3	2
2	**EC7PPE05**	Comprehensive Viva	-	-	-	2
3	**EC7PSP02**	Project I	-	-	6	3
				Total Credits		**24**

VIII SEMESTER B.Tech						
S. No.	Subject Code	Subjects	Periods / Week			Total Credit
			L[1]	**T[2]**	**P[3]**	
1	**EC8TPC14**	Radar and Satellite Engineering	3	1	0	4
2	**EC8TPC15**	Optical Fiber Communication	3	1	0	4
3	**EC8TPE07**	VLSI fabrication Methodology	3	0	0	3
5	**EC8TOE41-45**	41. Basic building block of Microwave Engineering 42.Mobile computing 43.Principle of Management 44.Embedded System45. Advanced Power Electronics	3	0	0	3
PRACTICAL						
1	**EC8PPC18**	Optical Fiber Communication	-	-	3	2
2	**EC8PPC19**	Advanced RF and MW Design lab	-	-	3	2
3	**EC8PSP03**	Project-II			8	4
4	**EC8PSP04**	Comprehensive Viva				2
				Total credit		**24**

INSTITUTE OF TECHNOLOGY

GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR

SCHEME OF B.Tech. VII^{rh}SEMESTER (CBCS)

ELECTRONICS & COMMUNICATION ENGINEERING

VIIth SEMESTER

S.No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	**EC7TPC12**	Microwave Engineering	3	1		40	60	100	4
2.	**EC7TPC13**	Wireless Mobile Communication	3	1		40	60	100	4
3.	**EC7TPE05**	Advance Hardware Design	3	0		40	60	100	3
4.	**EC7TPE06**	Power Electronics	3	0		40	60	100	3
5.	**EC7TOE31-EC5TOE35**	1. Wireless sensor network , 2 Information theory and coding 3.Nanotechnology 4.Optical instrumentation and measurement, 5. Neural network and fuzzy logic	3	0		40	60	100	3
		PRACTICAL							
6.	**EC7TPPC12**	Microwave Engineering			3	30	20	50	2
7.	**EC7TPPE05**	Comprehensive Viva			3	30	20	50	2
8.	**EC7PSP02**	Project-I			6	30	20	50	3
			15	**2**	**12**	**290**	**360**	**650**	**24**

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
EC7TPC12	3	1		3 hours	40	60	4

Microwave Engineering

CourseObjectives : Students will try to learn:
1. To understand Analysis of Waveguides and gain complete knowledge about Microwave Components.
2. Design of Impedance Matching and Tuning using lumped and distributed elements for network.
3. To Analysis and study characteristics of microwave tube Generators and Amplifiers.
4. To Analysis and study characteristics of microwave Semiconductor of detector, switch, generator and amplifier.

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 limitations 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, PIN diode; 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; Rate Race Junction, Isolator, Circulator, Attenuator, Phase Shifters.

UNIT –V

Microwave measurements & Systems: Microwave Bench, Measurement of Power, Wavelength, Frequency, Impedance, SWR, Attenuation, Q and Phase Shift, introduction of Microwave Integrated Circuits: MMIC´s, Strip Lines, Micro strip Lines. Electromagnetic interference and Electromagnetic Compatibility (EMI & EMC), Microwave Imaging.

SUGGESTED BOOKS &REFERENCE: -

- *Microwave Circuits and Devices, S Y Lio, PHI*
- *Foundation of Microwave Engineering, R E Collin, McGraw Hill*
- *Microwave Engineering, d m Pozar, John Wiley& Sons*
- *K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house*
- *Microwave and Radar Engineering, M Kulkarni, Umesh Publication*

Course Outcome: After completion of the course student will be able to:

1. Recognize the limitations of existing vacuum tubes and solid-state devices at microwave frequencies.
2. Study the performance of specialized microwave tubes such as klystron, reflex klystron, magnetron and Travelling wave tube.
3. Understand the operation of passive waveguide components.
4. Analyze microwave circuits using scattering parameters.
5. Test microwave components and circuits with standard microwave bench and vector network analyzer.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC7TPC13	3	1		3 hours	40	60	4

WIRELESS & MOBILE COMMUNICATION

Course Objectives: Students will try to learn:

1. To study the concept of Mobile radio propagation, cellular system design.
2. To understand mobile technologies like GSM and CDMA.
3. To know the mobile communication evolution of 2G, 3G and beyond in brief.

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. KamiloFeher, "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.

Course Outcome: After completion of the course student will be able to:
1 Understand the evolution of cellular communication systems upto and beyond 3G
2 Design a cellular link and estimate the power budget.
3 Choose proper multiple accessing methods depending on channel model
4 Identify traffic channels for call processing CO5 Calculate key performance metrics of a cellular communication system.

Sub Code	*L*	*T*	*P*	*Duration*	*IA*	*ESE*	*Credits*
EC7TPE05	*3*			*3 hours*	*40*	*60*	*3*

ADVANCE HARDWARE DESIGN

CourseObjective: Students will try to learn:
1. The architecture and operation of typical microprocessors and microcontrollers.
2. To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
3. To provide strong foundation for designing real world applications using microprocessors and microcontrollers

UNIT – I

Microprocessor Applications: Interfacing of LEDs, Common cathode and common anode connection, interfacing of keyboards, interfacing of seven segment device, Case studies of microprocessor based systems.

UNIT –II

Review of Evolution of Advanced Microprocessors:8086, 8088, 186/286/386/486/Pentium. RISC & CISC processor. Serial I/O & Data communication: RS 232c etc., Various BUS Standards, Introduction to ISA, EISA (82350 chip set).

UNIT –III

Microcontroller: Introduction to 8051 microcontroller, Architecture of 8051 microcontroller, Microcontroller resources, ALU, Special function register, Memory Organization, Internal and external memory. Assembly language programming.

UNIT –IV

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

UNIT –VEmbedded system: Introduction to Embedded system, Properties of embedded system, Working of embedded system, challenges of embedded systems

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.

CourseOutcome : After completion of course the student will be able to understand :

1 Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller.

2 Design the interfacing for 8051 microcontroller.

3. Select elements for an embedded systems tool.

Sub Code	*L*	*T*	*P*	*Duration*	*IA*	*ESE*	*Credits*
EC7TPE06	*3*			*3 hours*	*40*	*60*	*3*

Power Electronics

Course Objectives: Students will try to learn:

1. The basic theory of power semiconductor devices and passive components, their practical applications in power electronics.
2. To familiarize students to the principle of operation, design and synthesis of different power conversion circuits and their applications.
3. To provide strong foundation for further study of power electronic circuits and systems.

UNIT – I

Introduction to Power Electronics:- Introduction, Power electronics versus Linear Electronics, scope and applications. Overview of Power semiconductor switches.

Thyristor characteristics, Two transistor model of Thyristor. Thyristor Turn–On di/dt protection, dv/dt protection, Thyristor Turn–On , Series and parallel operation of Thyristor, Various Thyristor Commutation Techniques.

UNIT – II

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, , 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

UNIT – III

Inverters: Single Phase - Half and Full Bridge Inverter with R and RL Load, fourier analysis single phase inverter output voltage. Performance parameters, Voltage control of single phase inverters, 3-Phase Bridge Inverters, PWM inverters.

UNIT – IV

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 circuits:** Impulse commutated choppers, Impulse commutated three thyristor chopper, Resonant pulse choppers.

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.

Cycloconverters: Principle of cycloconverter operation. Single phase to single phase, Three phase to phase phase& Three phase to three phase cycloconverter.

SUGGESTED BOOKS &REFERENCE:-

Text Books:

1. Industrial Electronics & Control by B. Paul, PHI.
2. Power Electronics by M. D. Singh, Khanchandani, TMH.
3. Power Electronics by P.S Bhimbra, Khanna publications.

Reference Books:

1. Industrial & Power Electronics by H.C. Rai, Umesh Publications.
3. Power Electronics by P.C. Sen, TMH.
3. Power Electronics, M. H. Rashid, Pearson Publication.

CourseOutcome : At the end of the course, a student will be able to:

1. Relate basic semiconductor physics to properties of power devices, and combine circuit mathematics and characteristics of linear and non-linear devices.
2. Describe basic operation and compare performance of various power semiconductor devices, passive components and switching circuits
3. Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields.
4. Formulate and analyze a power electronic design at the system level and assess the performance.
5. Identify the critical areas in application levels and derive typical alternative solutions, select suitable power converters to control Electrical Motors and other industry grade apparatus.
6. Recognize the role power electronics play in the improvement of energy usage efficiency and the applications of power electronics in emerging areas.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC7TOE31	3			3 hours	40	60	3

WIRELESS SENSOR NETWORK

Course Objectives: Students will try to learn:

1. To Understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology
2. Understand the medium access control protocols and address physical layer issues
3. Learn key routing protocols for sensor networks and main design issues
4. Learn transport layer protocols for sensor networks, and design requirements
5. Understand the Sensor management, sensor network middleware, operating systems.

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, TaiebZnati Binding: Paperback Publisher: Springer/bsp Books Released: Rpt.2010*

CourseOutcome : At the end of the course the student will be able to understand:

1. Identify the components of Wireless Sensor Networks
2. Understand the challenges in network coverage and routing for energy efficiency
3. Define node Architecture for specific applications
4 .Program sensor network platforms using specialized operating system
5. Recognize upcoming challenges in Sensor Networks

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC7TOE32	3	0		3 hours	40	60	3

INFORMATION THEORY AND CODING

Course Objectives: Student will try to learn:

1. To equip students with the basic understanding of the fundamental concept of entropy and information as they are used in communications.
2. To enhance knowledge of probabilities, entropy, measures of information.
3. To guide the student through the implications and consequences of fundamental theories and laws of information theory and coding theory with reference to the application in modern communication and computer systems

UNIT 1: Uncertainty, information, Entropy, Joint Entropy and Conditional Entropy, Relative Entropy and Mutual Information, Relationship between Entropy and Mutual Information, Chain Rules for Entropy, Entropy of binary memoryless source and its extension to discrete memoryless source, source coding theorem, data compression, Prefix coding, Huffman coding, Lempel-Ziv coding, Source with memory and its entropy.

UNIT 2: Introduction to information Channels, Communication Channels, Continuous channels, discrete communication channels. Discrete memory less Channels, Channel Capacity, Channel coding theorem and its application to BSC, Shannon's theorem on channel capacity.

UNIT 3: Block Code and its Properties, Kraft-McMillan Equality and Compact Codes, Encoding of the source output, Shannon's encoding algorithm, Coding Strategies, Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding.

UNIT 4: Introduction to Error Control Coding, Linear block codes, Systematic codes and its encoding circuit, Syndrome and error detection, minimum distance, error detecting and correcting capabilities of block code, decoding circuit.

UNIT 5: Basic properties of Cyclic codes, Generator and parity check matrix of cyclic codes, Introduction to convolution code, its construction and Viterbi algorithm for maximum likelihood decoding.

SUGGESTED BOOKS:-

1. Lathi B. P., Modern Analog and Digital Communication Systems, Oxford Univ. Press
2. Shu Lin and Costello, Error Control Coding: Theory and Application, PH.
3. Sklar, Digital Communication, Pearson Education Asia.

Reference Books :

1. Haykins Simon, Digital Communication, Wiley Publ.
2. Proakis, Digital Communication, McGraw Hill
3. Schaum's Outline Series, Analog and Digital Communication

Subject Outcome: After completion of the course, the student is able to
1: Design the channel performance using Information theory.
2: Comprehend various error control code properties
3: Apply linear block codes for error detection and correction
4: Apply convolution codes for performance analysis & cyclic codes for error detection and correction.
5: Design BCH & RS codes for Channel performance improvement against burst errors.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC7TOE33	3	0		3 hours	40	60	3

NANOTECHNOLOGY

CourseObjectives: Student will try to learn:

1.To foundational knowledge of the Nanoscience and related fields.

2.To make the students acquire an understanding the Nanoscience and Applications

3. To help them understand in broad outline of Nanoscience and 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

CourseOutcome : At the end of the course, the student will be able to:

1. Understand the properties of Nano-materials and applications
2 .Apply chemical engineering principles to Nano-particle production
3. Solve the quantum confinement equations.
4. Characterize Nano-materials.
5. Scale up the production Nanoparticles for Electronics and Chemical industries.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC7TOE34	3	0		3 hours	40	60	3

Optical Instrumentation & Measurements

CourseObjectives: Student will try to learn:

1. The different types of optical sources and their characteristics.
2. The different aspects of optical instrumentation.
3. Study about different optical sensors.
4. Different methods to calculate the various parameter for optical fiber.

Unit 1. Light Sources: Introduction, LEDs, power, efficiency, types and structures of LEDs, characteristics and modulation, driver circuits, semiconductor lasers diodes, modulation characteristics, driving circuitry.

Unit 2. **Optical Instrument**: Optical time domain reflectometer, optical low coherence reflectometer,optical power and energy meter, monochrometer, CCD, optical spectrum analyzer, ellipsometer, Transducers, Lock-in-Amplifier, Box car averager.

Unit 3. Fiber optic components and devices: Direction couplers, beam splitters, switches modulations, connectors, couplers, polarizers, polarization controllers, amplifiers, fiber lasers, reflectors, wavelength filters, polarizing beam splitters, wavelength division multiplexers, fiber optic isolators etc.

Unit 4.Fibre optic sensors: Pressure, temperature, strain, magnetic and electric field sensors based on the characteristics like intensity, phase, polarization, frequency and wavelength of light wave.

Unit 5.Measurements methods in optical fibre: General experimental consideration, measurement of refractive index profile, numerical aperture, attenuation, pulse dispersion and bandwidth. Cut off wavelength, mode field diameter and birefringence of single mode fiber.

SUGGESTED BOOKS &REFERENCE:-

1. B. P. Pal : Fundamentals of Fibre Optics in Telecommunication and Sensor Systems, New Age, New Delhi, 1992.
2. A. K. Ghatak and K. Thyagarajan, Introduction to Fiber Optics, Cambridge, 1998.
3. S.M. Senior : Optical Fibre Communication: Principles and Practice, PHI, New Delhi, 2002.
4. A.K.Ghatak, M.R. Shenoy : Fibre Optics Measurements, Viva, New Delhi, 1995.

Course Outcome: After the successful completion of the course the students will be able to:

1. explain the basic concepts of optical transmitting and receiving

2. describe different opto- electronic devices
3. elucidate different methods of interferometry
4. describe selection of the appropriate optical fiber sensors for industrial application

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC7TOE35	3	0		3 hours	40	60	3

NEURAL NETWORK & FUZZY LOGIC SYSTEM

Course Objectives: Students will try to learn:
1. Concepts and understanding of artificial neural networks
2. Fuzzy logic basic theory and algorithm formulation
3. To solve real world problems.

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

Course Outcome : After completion of the course, the student will be able to

1: Comprehend the concepts of feed forward neural networks
2: Analyze the various feedback networks.
3: Understand the concept of fuzziness involved in various systems and fuzzy set theory.
4: Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
5: Analyze the application of fuzzy logic control to real time systems.

GURU GHASIDAS CENTRAL UNIVERSITY BILASPUR

SCHEME OF B.Tech. VIII^{rh}SEMESTER (CBCS)

ELECTRONICS & COMMUNICATION ENGINEERING

VIIIth SEMESTER

S.No:	Sub Code	Subject	Periods			Evaluation Scheme			Credit
			L	T	P	IA	ESE	Sub Total	
1.	**EC8TPC14**	Radar and Satellite Engineering	3	1		40	60	100	4
2.	**EC8TPC15**	Optical Fiber Communication	3	1		40	60	100	4
3.	**EC8TPE07**	VLSI Fabrication Methodology	3	0		40	60	100	3
5.	**EC8TOE41-EC8TOE45**	41. Basic building block of Microwave Engineering 42.Principle of Management 43 Mobile Computing 44.Embedded System45. Advanced Power Electronics	3	0		40	60	100	3
		PRACTICAL							
6.	**EC8TPPC15**	Optical Fiber Communication			3	30	20	50	2
7.	**EC8TPPC16**	Advanced RF and Microwave Design lab			3	30	20	50	2
8.	**EC8TPSP03**	Project-II			8	30	20	50	4
9	**EC8TPSP04**	Comprehensive Viva				30	20	50	2
			12	**2**	**14**	**280**	**320**	**600**	**24**

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
EC8TPC14	3	1		3 hours	40	60	4

RADAR &SATELLITE COMMUNICATION

Course Objectives: Student will try to learn:

1.The fundamentals of satellite communication.
2. To provide them with a sound understanding of how a satellite communication system successfully transfers information from one earth station to another.
3. Working principle of different RADAR systems and their applications.

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

SPACECRAFT: 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

Course Outcome: After completion of subject, the student will be able to understand
1 the working principle of different RADAR systems and their applications.

2. Understand the Satellite fundamentals and types of satellite.

3. Explain the working of a Satellite communication system and its other subsystems.

4. Know the applications of Satellites in different areas.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC8TPC15	3	1		3 hours	40	60	4

OPTICAL FIBER COMMUNICATION

Course Objectives: Students will try to learn:

1. The basics of signal propagation through optical fibers,
2. Study about fiber impairments, components and devices and system design.

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

Course Outcome: After completion of the course student will be able to:
1 Identify and characterize different components of an Optical Fiber Communication link.
2 Analyze optical source, Fiber and Detector operational parameters
3 Compute optical fiber link design parameters
4 Understand WDM, Optical Amplifiers, Optical Switching and networking technology concepts

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC8TPE07	3			3 hours	40	60	3

VLSI Fabrication Methodology

CourseObjective: Student will try to learn:
1.The basic MOS Circuits
2. the MOS Process Technology.
3. To understand the operation of MOS devices.
4.To impart in-depth knowledge about analog and digital CMOS circuits.

Unit 1

Introduction, Processing steps of BJT, Processing steps of MOSFET, Control of threshold voltage of MOS, Ion implantation, CVD, Patterning of polysilicon by etching, Self aligned technology, Advantage of polysilicon and problems of metal gate process.

Unit 2

Si structure, Packing density, Hard sphere model, Mismatch with dopant atom & Misfit factor, Concept of different crystal planes of Si, Natural cleavage plane, Self limiting etching or V-groove etching. Crystal defects- Point, Dislocation, Volume defects

Unit 3

Si crystal growth by Reduction process, Bridgemann Process, Czochralski Technique, Control of defects in crystal, Zone Refining, Gettering process.

Unit 4

Si Epitaxy, 3 cardinal rule of hetero-epitaxy, Liquid Phase Epitaxy, Vapor Phase Epitaxy, Problems of VPE, Tilted sample holder, Reactor configuration, Optimization of temperature and pressure, LPCVD from Silicon epitaxy by Silane route, Surface catalysed reaction, Efficiency of deposition, Problems of Silane route.

Unit 5

Doping during Epitaxy, Autodoping, Junction shift, Pattern shift and distortion, Molecular Beam Epitaxy, Insitu cleaning, Oxidation, Kinetics of oxidation

SUGGESTED BOOKS &REFERENCE:-

1. VLSI Fabrication Principles by S K Ghandhi,
2. VLSI Technologyed S M Sze,
3. Silicon VLSI Technology by J D Plummer, M Deal, P D Griffin

CourseOutcome: With the syllabus of this subject students can know the fabrication part of VLSI designing and also they can understand the methodology of VLSI.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC8TOE41	3			3 hours	40	60	3

Basic Building Blocks of Microwave Engineering

CourseObjective: Student will try to learn

1. Rectangular and circular wave guides using field theory.
2. The theoretical principles underlying microwave devices and networks.
3. To design microwave components such as power dividers, hybrid junctions, Directional Couplers, microwave filters, Microwave Wave-guides and Components, Ferrite Devices.
4. about Microwave Solid-State Microwave Devices and Microwave Tubes.
5. about Microwave Measurement Techniques.

Unit 1: Concept of Mode, TEM, TE, TM and Impedance concept. Loss associated with microwave transmission –Coaxial line, Rectangular waveguide, Circular waveguide, Planar transmission line.

Unit2: Challenges of Microwave design-Smith Chart (1^{st} tool), Measurement f unknown impedances, Need of impedance matching at Microwave frequencies, Lumped element based impedance matching network by Smith Chart, Distributed impedance matching by Smith Chart, Broadband impedance matching network.

Unit 3: Voltage and current at microwave frequency, Scattering parameter (2^{nd} tool) Properties of scattering parameter, Network analyser, Problem solving by equivalent voltage and current in waveguide and on scattering parameters.

Unit 4: Coaxial connectors, Microwave power divider and combiner, Microwave Resonators, Attenuators, Switching diode.

Unit 5: Microwave tubes, Microwave solid state diode oscillators, and Amplifiers, Microwave transistors

SUGGESTED BOOKS &REFERENCE:-

1. Microwave Engineering, David M Pozar,
2. Microwave Devices & Circuits, Samuel Y Liao,
3. Antenna Theory, C A Balanis

CourseOutcome : After completion of course, the student will be able to understand :

1. Integrating a wide range of Microwave components into one design oriented frame work
2. Design and solve real world problems
3. Characterize microwave devices in terms of the directionality of communication.
4. Use a microwave test bench in analyzing various types of microwave measurements.

5. Measure the various parameters in microwave engineering.
6. An in-depth knowledge of applying the concepts on real time applications
7. Design & analyze the micro wave integrated circuits.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC8TOE42	3			3 hours	40	60	3

PRINCIPLE OF MANAGEMENT

CourseObjectives: Student will try to learn:
1.The functions and responsibilities of managers.
2. To provide them tools and techniques to be used in the performance of the managerial job.
3. To enable them to analyze and understand the environment of the organization.
4. To help the students to develop cognizance of the importance of management principles.

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*

CourseOutcome: On completion of this course, the students will be able to

1: Understand the concepts related to Business.
2: Demonstrate the roles, skills and functions of management.
3: Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
4: Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC8TOE43	3			3 hours	40	60	3

MOBILE COMPUTING

CourseObjective: Studentwill try to learn:
1.About the concepts and principles of mobile computing;
2.To explore both theoretical and practical issues of mobile computing.
3. To develop skills of finding solutions and building software for mobile computing applications.

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.

CourseOutcome: Upon successful completion of this course, students will be able to understand:
1.the principles and theories of mobile computing technologies.

2.describe infrastructures and technologies of mobile computing technologies.

3.list applications in different domains that mobile computing offers to the public, employees, and businesses.

4. describe the possible future of mobile computing technologies and applications.

Sub Code	L	T	P	Duration	IA	ESE	Credits

EC8TOE44	**3**			**3 hours**	**40**	**60**	**3**

EMBEDDED SYSTEMS

Course Objective: Student will try to learn:
The modern embedded systems and to show how to understand and program such systems using a concrete platform built around.

UNIT-I Embedded system Introduction : Basic idea on system, definition of embedded system, characteristic of Embedded system,. Challenges in designing of an embedded system, characterization of embedded system.
UNIT-II Components of Embedded system : Difference between microprocessor and microcontroller, Functional building blocks of Embedded systems, processor and controller, Memory, ports and communication devices.

UNIT-III Methodologies, Life cycle and Modeling: Software Life cycle, Embedded Life cycle Water Fall Model , Spiral Model, RAD Model and Modeling of Embedded system. Simulation and Emulation.

UNIT-IV Layers of an Embedded system: Introduction, Need for Layering , The Middleware Layer, The Application Layer. Introduction to Real Time Operating Systems.

UNIT-V Networks for Embedded Systems : Serial Communication RS 232 model, I square Model, CAN and CAN Open, SPI and SCI, USB, HDLC, Parallel Communication Basics PCI interface and PCI X- interface. Device Driver Serial Port and Parallel Port.

SUGGESTED BOOKS &REFERENCES: -

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

CourseOutcome: After completion of the course student will be able to:

1. Identify the hardware and software components of an embedded system
2. Choose appropriate embedded system architecture for the given application
3. Write programs for optimized performance of an embedded system and validate

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC8TOE45	3			3 hours	40	60	3

Advanced Power Electronics

Course Objectives: Student will try to learn:

1.Selected areas of power electronics in greater depth.
2. Learn recent developments in power electronics.
3. in detail applications of power electronics

UNIT I Phase Controlled Rectifiers: Principle of phase control, Single Phase Full wave controlled converters: Midpoint and bridge type, analysis of two pulse bridge converter with continuous current., Single phase two pulse converters with discontinuous current

Unit-II
DC to DC switch mode Regulators: Introduction, Review of linear power supply and basic dc-dc voltage regulator configurations, Buck converters, Boost converters, Buck-Boost converters and their analysis for continuous and discontinuous conduction mode, other converter configurations.

Unit-III Resonant Converters: Introduction, Need of resonant converters, Classification of resonant converters, Load resonant converters, resonant switch converters, Zero Voltage Switching DC-DC Converters, Zero Current Switching DC-DC Converters, Applications Of Resonant Converters.

Unit-IV Multi-level converters: Need for multi-level inverters, Concept of multi-level, Topologies for multi-level: Diode Clamped, Cascaded H-bridge multilevel Converters configurations; Features and relative comparison of these configurations applications.

Unit-V Review of Inverters and Controllers: Review of single-phase half bridge, full bridge, bipolar, unipolar, VSI and CSI, review of single phase ac to ac controllers, Phase-Controlled Three-Phase AC Voltage Controllers.

Text Books:

1. Ned Mohan, Tore M. Undeland and William P. Robbins, "Power Electronics – Converters, Applications and Design", John Willey & sons, Inc., 3rd ed., 2003.
2. Muhammad H. Rashid, "Power Electronics - Circuits, Devices and Applications", Prentice Hall of India, 3rd ed., 2009.
3. Modern Power Electronics and AC Drives –B. K. Bose-Pearson Publications, 2002.
4. L. Umanand, "Power Electronics Essentials and Applications", Wiley India Ltd., 2009

REFERENCEBOOKS:-

1. P.C Sen, 'Thyristor DC Drives', John wiely and sons, New York, 1981.
2. R.Krishnan, 'Electric Motor Drives – Modeling, Analysis and Control', Prentice-Hall of India Pvt. Ltd.,New Delhi, 2003.
3. Muhammad H. Rashid, "Power Electronics Handbook", Elsevier, 3rd ed., 2011.

CourseOutcome: After completion of the course, the student will be able to understand:

1: Competency in function of various power electronics devices
2: Skill of analyzing power electronic devices
3: Know-how of advance Power electronics converter
4: Competency in designing FACTS controllers.
5: Capability to design Active power filters.