AICTE

Department of Electronics and Communication Engineering

Ujjain Engineering College, Ujjain

B. Tech. V Sem

Branch Electronics and Communication Engineering

Course Contents

Category of Course	Course Title	Course Code	Credits- 4C			Theory Papers (ES)
			L	T	P	
EC	Electromagnetic Waves	EC 5301	3	1	0	Max. Marks -70 Min. Marks- 30 Duration- 3 Hrs.

Unit –I

Transmission Lines- Equations of Voltage and Current on TX line, Propagation constant and characteristic impedance, and reflection coefficient and VSWR, Impedance Transformation on Loss-less and Low loss Transmission line, Power transfer on TX line, Smith Chart, Admittance Smith Chart, Applications of transmission lines: Impedance Matching, use transmission line sections as circuit elements.

Unit –II

Maxwell's Equations- Basics of Vectors, Vector calculus, Basic laws of Electromagnetics, Maxwell's Equations, Boundary conditions at Media Interface.

Unit –III

Uniform Plane Wave- Uniform plane wave, Propagation of wave, Wave polarization, Poincare's Sphere, Wave propagation in conducting medium, phase and group velocity, Power flow and Poynting vector, Surface current and power loss in a conductor.

Unit –IV

Plane Waves at a Media Interface- Plane wave in arbitrary direction, Reflection and refraction at dielectric interface, Total internal reflection, wave polarization at media interface, Reflection from a conducting boundary.

Unit –V

Wave propagation in parallel plane waveguide, Analysis of waveguide general approach, Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation in waveguide.

Text/Reference Books:

1. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005.
2. E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India.
3. Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
4. David Cheng, Electromagnetics, Prentice Hall.

AICTE

Department of Electronics and Communication Engineering

Ujjain Engineering College, Ujjain

B. Tech. V Sem

Branch Electronics and Communication Engineering

Course Contents

Category of Course	Course Title	Course Code	Credits- 5C			Theory Papers (ES)
			L	T	P	
EC	Principal of Digital Communication	EC 5302	3	1	1	Max. Marks -70 Min. Marks- 30 Duration- 3 Hrs.

Unit –I

Introduction to digital communications, Review of random variables, Poisson and Rayleigh probability density function, characteristic functions, derived distributions, Review of random process, Linear functional of random process, Stationary and wide sense stationary random process, Ergodic Random Process Power spectral density of digital data, Weiner Khinchine Theorem, Error Function, Correlation Autocorrelation and Cross-correlation, Central limit theorem, Error Probability, Co-variance, Correlation Coefficient.

Unit –II

Introduction to Sampling, Spectrum of Sampled Signal, Aliasing, Aperture Effect, Nyquist Criterion, Signal Reconstruction from Sampled Signal, Types of Sampling, Pulse Modulation (PAM, PWM, PP,), Time and Frequency Division Multiplexing, Channel Bandwidth of PAM-TDM System

Unit –III

Quantization, Uniform Quantizers – Midrise and Midtread, Quantization noise, Lloyd Max Quantization Algorithm, Non uniform Quantizers, Waveform coding: Pulse code modulation, Differential pulse code modulation, and delta modulation, Adaptive delta modulation, Noise Performance/ SNR in PCM and DM, Modulation - I: Complex baseband representation, degrees of freedoms, linear modulation, spectral description of linearly modulated signals, Modulation – II: Nyquist criterion, raised cosine family of pulses, Intersymbol interference.

Unit –IV

Modulation - III: Coherent binary modulation formats, e.g., ASK, FSK and PSK, Coherent QAM, M-ary modulation techniques, Quadrature Amplitude Modulation, Orthogonal and biorthogonal modulation, Hypothesis testing: Optimum decision region in AWGN, Optimum communication System, Correlation Filter, Matched Filter, Maximum Aposteriori Probability (MAP) and Maximum Likelihood Receiver, Theorem of irrelevance.

Unit –V

Performance analysis of binary and M-ary signaling schemes: Performance analysis of binary signaling schemes, Performance analysis of M-ary signaling schemes, bit-level demodulation, Non-coherent communication: Composite hypothesis testing, optimal demodulation for non-coherent communication, Performance analysis of non-coherent communication: Performance of binary and M-ary non-coherent communication.

Text/Reference Books:

1. Robert G. Gallager, "Principles of Digital Communication," Cambridge University Press, 2008.

AICTE

Department of Electronics and Communication Engineering

Ujjain Engineering College, Ujjain

B. Tech. V Sem

Branch Electronics and Communication Engineering

Course Contents

Category of Course	Course Title	Course Code	Credits- 5C			Theory Papers (ES)
			L	T	P	
EC	Digital Signal Processing	EC 5303	3	1	1	Max. Marks -70 Min. Marks- 30 Duration- 3 Hrs.

Unit –I

Discrete time signals: Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of signals.

Unit –II

Discrete systems attributes, Z-Transform, Analysis of LSI systems, frequency Analysis, Inverse Systems.

Unit –III

Discrete Fourier Transform (DFT),Fast Fourier Transform Algorithm, Implementation of Discrete Time Systems.

Unit –IV

Design of FIR Digital filters: Window method, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations; Lowpass, Bandpass, Bandstop and High pass filters.

Unit –V

Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multirate signal processing. Application of DSP.

Text/Reference Books:

1. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH
2. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
3. John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Applications, Prentice Hall, 1997.
4. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, PrenticeHall, 1992.
5. J.R. Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1992.
6. D.J.DeFatta, J. G. Lucas and W.S.Hodgkiss, Digital Signal Processing, John Wiley& Sons, 1988.

AICTE

Department of Electronics and Communication Engineering

Ujjain Engineering College, Ujjain

B. Tech. V Sem

Branch Electronics and Communication Engineering

Course Contents

Category of Course	Course Title	Course Code	Credits- 4C			Theory Papers (ES)
			L	T	P	
ECEL	CMOS VLSI DESIGN	EC 5311 EC 5315	3	0	1	Max. Marks -70 Min. Marks- 30 Duration- 3 Hrs.

Unit –I

Introduction : CMOS Logic, Inverter, NAND Gate, Combinational Logic, NOR Gate, Compound Gates, pass Transistor and Transmission Gates, Tristates, multiplexers, Latches and Flip-Flops, CMOS Fabrication and Layout : Inverter Cross-Section, Fabrication Process, Layout Design rules, Gate Layout, Stick Diagrams. VLSI Design Flow.

Unit –II

MOS Transistor Theory : Ideal I-V Characteristics, C-V Characteristics : MOS Capacitance Models, MOS Gate Capacitance Model, MOS Diffusion Capacitance Model Non ideal I-V Effects : Velocity Saturation and Mobility Degradation, Channel Length Modulation Body Effect, Subthreshold Conduction, Junction Leakage, tunneling, temp. and Geometry Dependence. DC Transfer Characteristics : Complementary CMOS inverter DC Characteristics, Beta Ratio Effects, Noise Margin, Ratioed inverter Transfer Function, Pass Transistor DC Characteristics, Tri State inverter, Switch- Level RC Delay Models.

Unit –III

CMOS Processing Technology : CMOS Technologies, Background Water Formation, Photolithography, Well and Channel Formation Silicon Dioxide (SiO_2) , isolation Gate Oxide Gate and Source/Drain Formation Contacts and metallization, passivation, metrology, Layout Design Rules: Design Rules Background, Scribe line and other structures MOSIS Scalable CMOS Design Rules, Micron Design Rules, CMOS process Enhancements: Transistors, Interconnect Circuit Elements Beyond Conventional CMOS.

Unit –IV

Circuit Characterization and performance Estimation: Delay Estimation, RC Delay Models, Linear Delay Model, logical Effort, Parasitic delay, logical effort and Transistor sizing: delay in a Logic Gate, Delay in Multistage logic Networks, choosing the Best Number of Stages.

Unit –V

Power Dissipation: Static Dissipation, Dynamic Dissipation, Low-power Design interconnect: Resistance, Capacitance, Delay Crosstalk. Design Margin: Supply Voltage, Temperature, Process Variation, Design Corners. Reliability, Scaling.

Text/Reference Books:

1. Neil H.E. Weste, David harris, Ayan Banerjee : CMOS VLSI Design, Third Edition Pearson Education.
2. Neil H.El Waste, Kamran Eshraghian : principle of CMOS VLSI Design, Pearson Education.
3. J.P. Uyemura: Chip Design for submicron VLSI, cengage Learning.

Department of Electronics and Communication Engineering

Ujjain Engineering College, Ujjain

B. Tech. V Sem

Branch Electronics and Communication Engineering

Course Contents

Category of Course	Course Title	Course Code	Credits- 3C			Theory Papers (ES)
			L	T	P	
OEL	Software Engineering & Project Management	CS5351 CS 5305	3	0	0	Max. Marks -70 Min. Marks- 30 Duration- 3 Hrs.

Unit –I

Introduction to software engineering- scope of software engineering – historical aspects, economic aspects, maintenance aspects, specification and design aspects, team programming aspects. Software engineering a layered technology – processes, methods and tools. Software process models – prototyping models, incremental models, spiral model, waterfall model.

Unit –II

Process Framework Models: Capability maturity model (CMM), ISO 9000. Phases in Software development –requirement analysis- requirements elicitation for software, analysis principles, software prototyping, specification.

Unit –III

Planning phase – project planning objective, software scope, empirical estimation models-COCOMO, single variable model, staffing and personal planning. Design phase – design process, principles, concepts, effective modular design, top down, bottom up strategies, stepwise refinement.

Unit –IV

Coding – programming practice, verification, size measures, complexity analysis, coding standards. Testing – fundamentals, white box testing, control structure testing, black box testing, basis path testing, code walk-throughs and inspection, testing strategies-Issues, Unit testing, integration testing, Validation testing, System testing

Unit –V

Maintenance-Overview of maintenance process, types of maintenance. Risk management: software risks – risk identification-risk monitoring and management. Project Management concept: People – Product-Process-Project. Project scheduling and tracking.

Text/Reference Books:

1. Ian Sommerville, Software Engineering, University of Lancaster, Pearson Education, Seventh edition, 2004.
2. K. K.Aggarwal and Yogesh Singh, Software Engineering, New age International Publishers, Second edition, 2005.
3. Roger S. Pressman, Software Engineering : A practitioner's approach, McGraw Hill publication, Eighth edition, 2014.
4. S.A. Kelkar, Software Project Management: A concise study, PHI, Third edition, 2012.
5. Walker Royce, Software Project Management : A unified frame work, Pearson Education, 1998.