AY 2024-25, SEM II, COURSE STRUCTURE AND DETAILED SYLLABUS

ELECTRONICS AND COMMUNICATION ENGINEERING

(I–IV Years Syllabus)

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

Basar, Nirmal, Telangana – 504107

FIRST YEAR (E1) – SEMESTER – II

Sl. No	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	MA1201	Differential Equations and Vector Calculus	BSC	3	1	0	4	4
2	PH1201	Engineering Physics	BSC	3	0	0	3	3
3	PH1801	Engineering Physics Lab	BSC	0	0	3	3	1.5
4	CE1801	Engineering Graphics	ESC	0	1	4	5	3
5	EC1201	Electronic Devices and Circuits	PCC	3	1	0	4	4
6	EC1202	Network Analysis	PCC	3	1	0	4	4
7	EC1801	Electronic Devices and Circuits lab	PCC	0	0	3	3	1.5
8	HS1201	English	HSMC	2	0	0	2	2
9	HS1801	English Lab	HSMC	0	0	2	2	1
Total				**14**	**4**	**12**	**30**	**24**

SECOND YEAR (E2) – SEMESTER – II

Sl. No.	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	MA2201	Numerical Methods	BSC	3	0	0	3	3
2	CS2205	Object Oriented Programming	ESC	3	0	0	3	3
3	CS2804	Object Oriented Programming Lab	ESC	0	0	2	2	1
4	EE2205	Control systems	ESC	3	1	0	4	4
5	EC2201	Analog Circuits	PCC	3	1	0	4	4
6	EC2801	Analog Circuits Lab	PCC	0	0	2	2	1
7	EC2203	Electromagnetic Waves	PCC	3	0	0	3	3
8	EC2202	Digital Systems Design	PCC	3	0	0	3	3
9	EC2802	Digital Systems Design and VLSI Lab	PCC	0	0	2	2	1
10	BS2201	Environmental Science	MC	2	0	0	2	0
Total				**20**	**2**	**6**	**28**	**23**

THIRD YEAR (E3) – SEMESTER – II

Sl. No.	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	CS3204	Computer Networks	ESC	3	0	0	3	3
2	CS3205	Operating Systems	ESC	3	0	0	3	3
3	EC3201	Microprocessor and Microcontrollers	PCC	3	0	0	3	3
4	EC3801	Microprocessor Lab	PCC	0	0	2	2	1
5	EC3202	RF and Microwave Engineering	PCC	3	0	0	3	3
6	EC3802	RF and Microwave Eng. Lab	PCC	0	0	2	2	1
7	EC3212	Machine Learning Techniques	PEC	3	0	0	3	3
8	EC3221	Digital Image Processing	PEC	3	0	0	3	3
9	HS3203	Soft Skills	HSMC	1	0	0	1	1
10	EC3902	Mini Project-II	SIP	0	0	2	2	1
Total				**19**	**0**	**6**	**25**	**22**

FOURTH-YEAR (E4) – SEMESTER – II

Sl. No.	Course Code	Course Title	Course Category	L	T	P	Total Contact Hours	Credits
1	EC4406	Wireless Sensor Networks	OEC	3	0	0	3	3
2	BM4210	Professional Law and Ethics	OEC	3	0	0	3	3
3	EC4902	Project-II	SIP	0	0	12	12	6
4	EC4000	Comprehensive Viva - II						
Total				**6**	**0**	**12**	**18**	**12**

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
MA1201	Differential Equations and Vector Calculus (DEVC)					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- Methods of solving the differential equations of first and higher order.
- To study the methods of solving improper integrals and the concepts of multiple integrals.
- The basic properties of vector-valued functions and their applications to line, surface and volume integrals.
- To study numerical methods to analyze experimental data.

Course Outcomes

1. Solve first-order linear differential equations and special non-linear first-order equations like Bernoulli, Riccati & Clairaut's equations and compute double integrals over rectangles and type I and II" regions in the plane.
2. Explain the concept of a vector field and make sketches of simple vector fields in plane
3. Explain the concept of a conservative vector field, state and apply theorems that give necessary and sufficient conditions for when a vector field is conservative, and describe applications to physics
4. Apply a gradient to solve problems involving normal vectors to level surfaces.
5. Recognize the statements of Stokes' Theorem and the Divergence Theorem and understand how they are generalizations of the Fundamental Theorem of Calculus.
6. Able to solve problems in diverse fields of engineering science using numerical methods.

UNIT-I: Ordinary Differential Equations of first order

Exact first order differential equation, finding integrating factors, linear differential equations, Bernoulli's, Riccati, Clairaut's differential equations, finding orthogonal trajectory of the family of curves, Newton's Law of Cooling, Law of Natural growth or decay.

UNIT-II: Ordinary Differential Equations of higher order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax},$sin\ sin\ (ax)$, $cos\ (ax)$, polynomials in$x, e^{ax}V(x), xV(x)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: Integral Calculus

Evaluation of the double integrals (Cartesian and Polar), change of order of integration (only Cartesian form), Evaluation of Triple integrals. Change of variables (Cartesian to polar) in case of double integrals (Cartesian to spherical and cylindrical) in case of Triple Integrals-Jacobians of transformations. Differentiation of integrals with variable limits - Leibnitz rule.

Applications: Finding Areas (using double integrals) and volumes (using double and Triple Integrals), Centre of mass, and Centre of gravity for constant and variable densities by double and triple integrals (applications involving cubes, Spheres and rectangular parallelepiped)

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Numerical Methods: Introduction and motivation about numerical methods, True value, approximate value, error, error percentage, algebraic equations, transcendental equations, Newton-Raphson method, and Bisection method.

Text Books:

1. Advanced Engineering Mathematics (3rd Edition) by R. K. Jain and S. R. K. Iyengar, Narosa Publishing House, New Delhi
2. Advanced Engineering Mathematics (8th Edition) by Erwin Kreyszig, Wiley-India.

References:

1. Dr M.D. Raisinghania, Ordinary andPartialdifferentialequations, S.CHAND,17th Edition2014.

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
PH1201	Engineering Physics					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Understand the fundamental concepts of vectors, gradient, divergence, and curl, and their applications in mathematical physics.
- Gain knowledge of Maxwell's equations, boundary conditions, and electromagnetic wave propagation in different media.
- Develop a strong foundation in quantum mechanics, including wave functions, Schrödinger's equations, and the particle in a box problem.
- Acquire a comprehensive understanding of the electron structure of solids, crystallography, and crystal systems.
- Explore the principles of semiconductor physics, including intrinsic and extrinsic semiconductors, Fermi level, and energy band gaps, with a focus on practical applications.

Course Outcomes

1. Master vector calculus and its applications in physics.
2. Understand electrodynamics and wave propagation.
3. Learn the principles of quantum mechanics.
4. Gain knowledge of electron structure in solids.
5. Develop an understanding of semiconductor physics.

Unit I: Vectors and Mathematical Physics

Gradient, Divergence, Curl and its applications, Line, surface and volume integrals, Stokes and Gauss theorem: Applications, Curvilinear Coordinates: Polar, Cylindrical and spherical co-ordinates, Problems.

Unit II: Electrodynamics

Electrodynamics before Maxwell, Fixing of Ampere's Law, Maxwell Equations in Matter,

Boundary Conditions, Continuity Equation, Poynting Theorem, Wave equation for E and B, Monochromatic Plane Waves, Energy and Momentum in EM Waves. Propagation in Linear Media, Reflection and Transmission at Normal Incidence.

Unit III: Quantum Mechanics

Introduction to Quantum Mechanics, De-Broglie's waves and uncertainty principle, Wave Function and its Significance, Time dependant and time independent Schrodinger wave equations, Particle in a box - Problems.

Unit IV: Electron Structure of Solids

Introduction to Crystallography, Bravais Lattices and crystal systems, Atomic Packing, Atomic Radii, Crystal Structures (SC, BCC and FCC), Miller Indices, Classical Free electron Theory.

Unit V: Semiconductor Physics

Intrinsic and extrinsic semiconductors, Fermi level and carrier- concentration, Effect of temperature on Fermi level. Mobility of charge carriers and effect of temperature on mobility, Hall Effect, Energy band gap determination of semiconductors by four probe method, Direct and Indirect Band gap semiconductors.

Text Books:

1. Malik, H.K., & Singh, A.K. Engineering Physics.
2. Griffiths, D.J. Introduction to Electrodynamics.

References:

1. Aruldhas, G. Quantum Mechanics.
2. Kittel, C. Introduction to Solid State Physics.

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
PH1801	Engineering Physics Lab					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- To gain practical knowledge by applying experimental methods to correlate with the theory.
- Apply analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic understanding of various experimental principles involved.

Course Outcomes

1. Prepare and perform individually a wide spectrum of experiments.
2. Present experimental data in various appropriate forms like tabulation and plots.
3. Analyze, interpret and summarize the experimental results.
4. Communicate the understanding of various experimental principles, instruments/setups, and procedures.

List of experiments:

1. Photoelectric effect
2. Hall effect
3. Ultrasonic Interferometer
4. Melde's Experiment
5. Four probe Method
6. Frank Hertz Experiment
7. Seebeck and Peltier effect
8. Solar cell
9. Couple pendulum

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
CE1801	Engineering Graphics					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	1	4	40	60	3

Course Objectives

- To introduce the students to the "Universal Language of Engineers" for effective communication through drawing.
- To understand the basic concepts of drawing through modern techniques.
- To impart knowledge about standard principles of projection of objects.
- To provide the visual aspects of Engineering drawing using Auto-CAD.

Course Outcomes

1. Use Engineering principles and techniques to understand and interpret engineering drawings.
2. Understand the concepts of Auto-CAD.
3. Draw orthographic projections of lines, planes and solids using Auto-CAD.
4. Use the techniques, skills and modern engineering tools necessary for engineering practices.

UNIT-I: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, types of lines and Dimensioning.

Overview of Auto-CAD: Theory of CAD software (The Menu System, ToolBars, drawing area, Dialogue boxes, Shortcut Menu, the command lines, Select and erase objects, Introduction to layers etc.), Drawing simple figures- lines, planes, solids.

UNIT-II: Geometrical constructions

Construction of regular polygons.

Conic sections: Construction of Ellipse, Parabola, Hyperbola (General method only), Cycloid, Epicycloid, Hypocycloid and Involutes.

Scales: Construction of Plain, Diagonal and Vernier scales.

UNIT-III:

Orthographic projections: Principles of Orthographic Projections

Projections of Points: Projections of Points placed in different quadrants

Projection of lines: lines parallel and inclined to both the planes (Determination of true lengths and true inclinations and traces)

Projection of planes: Planes inclined to both the reference planes

UNIT-IV:

Projection of Solids: Projection of solids whose axis is parallel to one of the reference planes and inclined to the other plane, axis inclined to both the planes

Projection of sectioned solids: Sectioning of simple solids like prism, pyramid, cylinder and cone in a simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – obtaining the true shape of the section.

UNIT-V:

Development of surfaces: Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone

Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views of planes and simple solids

Perspective projections: Basic concepts of perspective views.

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007

References:

1. Shah, M.B. Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age publications
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Textbook on Engineering Drawing, Scitech Publishers (Corresponding set of) CAD Software Theory and User Manuals

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
EC1201	Electronic Devices and Circuits (EDC)					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- To introduce the fundamental concepts of semiconductor materials and its characteristics.
- To study Rectifier and Filter circuits.
- To understand the applications of Bipolar Junction Transistors ..
- To understand the applications of Field effect Transistors.
- To understand the construction and working of the Tunnel Diode and Varactor Diode.

Course Outcomes

1. Students will be good at fundamental concepts of semiconductor materials and their characteristics.
2. Students will be able to understand the Rectifiers and Filter Circuits.
3. Students will be good at the basic structure of BJT and Its Applications with its different modes of operation.
4. Students will know the applications of Field Effect Transistors and their different modes of operation.
5. Students will be good at the basic structure of the Tunnel diode, Varactor diode with its working.

UNIT-1:Semiconductor Physics

Review of semiconductor physics. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equation, Hall effect.

Diodes: Qualitative Theory of P-N Junction, P-N Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, the Temperature dependence of V-I characteristic, Ideal versus Practical – Resistance levels(Static and Dynamic), Transition and Diffusion Capacitances, Diode

Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics and its applications.

UNIT-II: Rectifiers and Filters

Clippers and clampers.The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, π- Section Filters, Comparison of Filters.

Opto-Electronics: Optical sources: LED, Direct & Indirect band gap semiconductors. Optical detectors: Photodiode, Pin diode, Solar cell.

UNIT-III: Bipolar Junction Transistor

The Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, non-ideal effects of BJT: Base width modulation, Emitter band gap narrowing, non-uniform base doping, breakdown voltage. BJT Operation, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, BJT Specifications.

Transistor Biassing and Stabilization: Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector-Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE} and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability.

UNIT-4: Field Effect Transistor

The Junction Field Effect Transistor (Construction, principle of operation, symbol) – Pinch-off Voltage - Volt-Ampere characteristics, The JFET Small Signal Model, MOSFET (Construction, principle of operation, symbol), MOSFET Characteristics in Enhancement and Depletion modes.

FET Amplifiers: FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing FET, FET as Voltage Variable Resistor, Comparison of BJT and FET.

UNIT-V: Special Purpose Electronic Devices

Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode.

Text Books:

1. G. Streetman, and S. K. Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson,2014.
2. D. Neamen, D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education

References:

1. Jacob Millman, Christos C Halkias and Satyabrata JIT, “ Electronics Devices and Circuits”, 3rd Edition.
2. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley&Sons, 2006.
3. C.T. Sah, “Fundamentals of solid-state electronics,” World Scientific Publishing Co. Inc, 1991.
4. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford Univ.Press, 2011.

Online Resources:

1. https://www.youtube.com/@esegatepreparationforecest7171
2. https://www.youtube.com/watch?v=xhn188JafbM&list=PL350612601E2DBFDE

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
EC1202	Network Analysis (NA)					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- To teach fundamentals of Electric Circuits, their components and the mathematical Tools used to represent and analyze Electrical circuits.
- To inculcate fundamentals of Ohm‘s law, Kirchhoff‘s laws and be able to solve for currents, voltages and power in complex circuits.
- Explain to loop current and node voltage equations for arbitrary DC, AC networks including resistors, capacitors, and inductors, dependent and independent sources
- To analyse circuits in the time and frequency domain and analyse the coupled circuits.
- Familiarize various two-port network parameters and their relations and develop the design and analysis of basic DC and AC circuits with network topologies

Course Outcomes

1. Apply the knowledge of basic circuital law and simplify the network using reduction techniques.
2. Analyse the circuit using Kirchhoff’s law and Network simplification theorems.
3. Infer and evaluate transient response, Steady state response, and network functions.
4. Obtain the maximum power transfer to the load, and Analyse the series resonant and parallel resonant circuit.
5. To design various two-port network parameters and relations between them.

UNIT-I: Introduction of Networks

Mechanism of electrical energy flow through the conductor and basic Ohm’s law, passive lumped R, L, C’s and Ohm’s law, types of elements, sources, Kirchhoff’s laws, Nodal and Mesh Analysis Techniques, Equivalent circuits with respect to passive R, L, C’s, equivalent circuits with respect to active sources, source transformation technique, Power calculation by tellegen's theorem.

UNIT-II: Network theorems

Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation, Duality, Milliman's and Tellegen's theorem as applied to AC & DC circuits.Graph Theory: Complete graph or standard graph, connected graph, subgraph, tree of a graph, co-tree (complemented tree), planar graph etc. Incidence matrix, Fundamental Loop matrix or tie set matrix, cut set matrix and its properties.

UNIT-III: Introduction to Transient Analysis

Classification of transients, DC transients: source-free circuits (source-free RL, RC, RLC circuits), with sources, initial and final conditions, Laplace transform approach (LTA) for solving transient problems. AC transients: steady-state response and transient-free condition for RL, RC, and RLC circuits.

UNIT-IV: AC circuit analysis

Sinusoidal steady state analysis by using phasors, phasor diagrams, the concept of resonance or frequency domain analysis of RLC circuits.Average and RMS values of periodic signals, power calculations, locus or circle diagrams.

Coupled circuits: Analysis of coupled circuits, self-inductance, mutual inductance, coefficient of coupling, a series connection of coupled coils, modelling of coupled circuits, dot convention in coupled coils. The electrical equivalent of magnetically coupled circuits, tuned coupled circuits (single-tuned and double-tuned coils), and example problems.

UNIT-V: Two-Port networks

Symmetric and reciprocal networks. Z, Y, h, g, ABCD, A'B'C'D' parameters and their equivalent circuit representations. Cascade connection of 2-two port networks, Two port network representation for ideal transformer. Interrelationships between parameters of two port networks, proofs for symmetry and reciprocity conditions. Interconnection of two-port networks (series and parallel two-port networks). T and representations, lattice networks, image parameters, ladder networks.

Text Books:

1. Van, Valkenburg "Network analysis"; Prentice Hall of India, 2000.
2. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education.

References:

1. Sudhakar, A.Shyammohan, S.P.; "Circuits and Networks"; Tata McGraw-Hill NewDelhi, 1994.
2. Kuo F. F., "Network Analysis and Synthesis", 2nd Ed., Wiley India. 2008.

Online Resources:

1. Network Analysis by Prof. T.K. Bhattacharya, IIT Kharagpur, https://nptel.ac.in/courses/108105159

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
EC1801	Electronic Devices and Circuits Lab					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

- To understand the usage of basic electronic equipment like Oscilloscope, Function generator, Multimeter ..etc.
- To understand the basic electronic components like passive components, active components, breadboard, etc.
- To design the basic circuits by using diodes, Zener diodes etc.
- To understand the characteristics of the diodes, Transistors.

Course Outcomes

1. Students get the ability to use basic electronic equipment like an Oscilloscope, Function generator, Multimeter ..etc.
2. Students will have knowledge of the basic electronic components like passive components, active components, breadboards, etc.
3. Students can design the basic circuits by using diodes, Zener diodes etc.
4. Students having the knowledge on characteristics of the diodes, Transistors.

List of experiments:

1. Familiarization with electrical components and usage of a multimeter.
2. Familiarization with Oscilloscope and function generator.
3. Frequency response and square wave rectification of RC, CR and RL networks.
4. Characteristics of Diodes:
   a. PN Junction Diode
   b. Zener Diode
   c. Light Emitting Diode
5. Characteristics of Transistor Bipolar Junction Transistor
6. Characteristics of JFET
7. Characteristics of MOSFET
8. Half wave and full wave rectifiers, Rectification with capacitance filters, Zener diode and IC regulation.

9. Study of CE amplifiers on the kit.

Text Books:

1. Electronic Devices and Circuit Theory – Robert L.Boylestad, Louis Nashelsky, 9th edition, 2008 PE.
2. Electronic Devices and Circuits- David A. Bell- 5th Edition, Oxford University Press.

References:

1. Jacob Millman, Christos C Halkias and Satyabrata JIT, " Electronics Devices and Circuits", 3rd Edition.
2. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson,2014.
3. D. Neamen, D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education.
4. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley&Sons, 2006.
5. C.T. Sah, "Fundamentals of solid-state electronics," World Scientific Publishing Co. Inc, 1991.
6. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ.Press, 2011.

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
HS1201	English					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	2	0	0	40	60	2

Course Objectives:

- To improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- To equip the students with academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- To develop study skills and communication skills in formal and informal situations.

Course Outcomes

1. Use English Language effectively in spoken and written forms
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Introduction

In the view of growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students. In English classes, the focus is on skills development in vocabulary, grammar, reading and writing etc... For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the entire text that develops reading comprehension and different relevant texts or passages may be given to the students in the class to inculcate reading habits. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the activities with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc... The focus of this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

UNIT –I

Title: 'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation -The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and its Importance- Techniques for Effective Reading.

BasicWriting Skills: Sentence Structures -Use of Phrases and Clauses in Sentences Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II

Title: 'Ancient Architecture in India' from the prescribed textbook 'English for Engineers'published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III

Title: 'Blue Jeans' from the prescribed textbook 'English for Engineers' published byCambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying-** Providing Examples or Evidence

UNIT –IV

Title: 'What Should You Be Eating?' from the prescribed textbook 'English for Engineers'published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices-Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V

Title: 'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'Englishfor Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.
2. Swan, M. (2016). Practical English Usage. Oxford University Press

References:

1. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
2. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
3. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
4. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
5. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title					Course Type
HS1801	English Lab					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	50	50	1

Course Objectives

- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm.
- To demonstrate a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity to practice speaking.
- To improve the fluency of students in spoken English and neutralize accent for the intelligibility.
- To train students to use language appropriately for public speaking and interviews.

Course Outcomes

1. Students would be able to learn the nuances of English language through an audio-visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking skills with clarity and confidence which in turn enhances their employability skills
4. To facilitate computer-assist multi-media instruction enabling individualized and independent language learning.

UNIT – I

Understand Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening - Communication at Work Place- Spoken v/s written language.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants -Ice-Breaking Activity and Just a Minute (JAM) Session- Situational Dialogues – Greetings – Taking Leave– Introducing Oneself and Others.

UNIT – II

Understand Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context- Features of Good Conversation – Non-verbal Communication.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context- Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

UNIT – III

Understand Intonation-Errors in Pronunciation-Mother Tongue Influence (MTI)- How to make Formal Presentations.

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation- Formal Presentations.

UNIT – IV

Understand Listening for general/specific information in Public Speaking – Exposure to Structured/TEDX Talks

Practice: Listening Comprehension Tests- Making a Short Speech – Extempore

UNIT – V

Understand Listening for Specific Details- Interview Skills.

Practice:Listening Comprehension Tests- Mock Interviews.

References:

(Following softwares have been installed in English Language Labs)

1. Clarity English Success - Software
2. Connected Speech- Software
3. Issues in English 2- Software
4. English Pronunciation in use by Mark Hencock (Book)

Online Resources:

1. https://www.youtube.com/watch?v=tUovsnX1GQE (Mark Hencock)
2. http://www.clarityenglish.com/program/practicalwriting/
3. http://www.clarityenglish.com/program/roadtoielts/
4. http://www.clarityenglish.com/program/clearpronunciation1/
5. http://www.clarityenglish.com/program/resultsmanager/

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
MA2201	NUMERICAL METHODS					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Understand sources of errors and convergence rates in solving nonlinear equations.
- Apply direct and iterative methods to solve systems of linear equations.
- Use polynomial interpolation and numerical integration to approximate functions and definite integrals.
- Apply numerical methods to solve ordinary differential equations of different orders.
- Use the finite difference method to solve boundary value and eigenvalue problems in differential equations

Course Outcomes

1. Identify and solve nonlinear equations accurately.
2. Solve systems of linear equations using different methods.
3. Approximate functions and definite integrals with high accuracy.
4. Solve ordinary differential equations and evaluate stability.
5. Solve boundary value and eigenvalue problems in differential equations with high accuracy

Unit 1: Error in numerical calculations and Solutions of equations one variable

Source of errors, significant digits and numerical instability. Solutions of nonlinear equations: Bisection method, Method of false position, Newton-Raphson method, Fixed-point iteration, Rates of convergence of these methods. Iteration based on the second-degree equation: Muller method.

Unit-II: Solution of the system of linear algebraic equations

Direct methods: Gauss and Gauss– Jordan methods. Crout's triangularization method. Iterative methods: Gauss-Jacobi and Gauss-Seidel methods, Relaxation method.

Unit –III: Interpolation and Numerical Integrations

Interpolation: Polynomial Interpolation: Lagrange's interpolation, Newton's divided difference interpolation polynomial, Gregory-Newton Forward and Backwards difference interpolation formulae, Piecewise and Spline interpolation. Numerical integration: Trapezoidal and Simpson rules.

Unit-IV: Numerical solution of ODE

Differentiation formulas in the case of equally spaced points. Numerical solution of ordinary differential equations: Single step methods: Taylor series method, Picard's Method, Euler and Modified Euler methods, Runge – Kutta methods of 2nd and 4th order. Multi-step methods: Miline's Predictor-Corrector formulas, Adam-Bashforth and Adam-Moulton formulas.

Unit-V: Finite difference methods

Solution of Linear difference equations with constant coefficients, Solutions of boundary value problems in ordinary differential equations, Approximate solution of eigenvalue problems, Finite difference methods for solving two-dimensional Laplace's equation for a rectangular region, Finite difference method of solving heat equation and wave equation with given initial and boundary conditions.

Textbooks:

1. Froberg C. E., Introduction to Numerical Analysis 2nd edition, Addison Wesley, 1970.
2. Gerald C. F., Wheatley P.O., Applied Numerical Analysis, 6th edition, Pearson Asia,2002

References:

1. Jain M.K., IyengarS.R.K., Numerical methods for Scientific and Engineering Computation, 3rd edition, New Age International (P) Ltd, 1996.
2. Phillips G.M., Taylor P.J., Theory and Applications of Numerical Analysis, 2nd edition Academic Press,

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
CS2205	Object Oriented Programming (OOP)					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- The course will introduce standard tools and techniques for software development, using an object-oriented approach, use of a version control system, an automated build process, an appropriate framework for automated unit and integration tests.
- To understand Object-oriented programming concepts, and apply them in Problem-solving.
- To learn the basics of Java Console and GUI-based programming

Course Outcomes

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity
3. Name and apply some common object-oriented design patterns and give examples of their use Design applications with an event-driven graphical user interface.

UNIT-I:

Introduction to OOPS: Paradigms of Programming Languages, Basic concepts of Object Oriented Programming, Differences between Procedure Oriented Programming and Object Oriented Programming, Objects and Classes, Data abstraction and Encapsulation, Inheritance, Polymorphism, benefits of OOP, application of OOPs.

Java: History, Java features, Java Environment, JDK, API.

Introduction to Java: Types of Java program, Creating and Executing a Java program, Java Tokens, Keywords, Character set, Identifiers, Literals, Separator, Java Virtual Machine (JVM), Command Line Arguments, Comments in Java program.

UNIT -II:

Elements: Constants, Variables, Data types, Scope of variables, Type casting, Operators: Arithmetic, Logical, Bitwise operator, Increment and Decrement, Relational, Assignment, Conditional, Special operator, Expressions – Evaluation of Expressions

Decision making and Branching: Simple if statement, if, else statement, Nesting if, else, else if Ladder, switch statement, Decision making and Looping: While loop, do-While loop, for loop, break, labelled loop, continue Statement, Simple programs

Arrays: One Dimensional Array, Creating an array, Array processing, Multidimensional Array, Vectors, Wrapper classes, Simple programs

UNIT-III:

Strings: Exploring String class, String Class Methods, String Buffer Class, Simple programs

Class and objects: Defining a class, Methods, Creating objects, Accessing class members, Constructors, Static members, Nesting of Methods, this keyword, Command line input.

Polymorphism – Static Polymorphism, Dynamic Polymorphism, Method overloading, Polymorphism with Static Methods, Private Methods and Final Methods.

Inheritance: Defining a subclass, Deriving a sub-class, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Overriding methods, Final variables and methods, Final classes, Finalizer methods, Abstract methods and classes, Visibility Control: Public access, Private access, default and protected. Abstract classes.

Interfaces - Interfaces vs Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interfaces. Inner classes - uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

UNIT- IV:

Packages: Java API Packages, System Packages, Naming Conventions, Creating & Accessing a Package, Adding Class to a Package, Hiding Classes, Programs

Exception Handling: Limitations of Error handling, Advantages of Exception Handling, Types of Errors, Basics of Exception Handling, try blocks, throwing an exception, catching an exception, finally statement

Multithreading: Creating Threads, Life of a Thread, Defining & Running Thread, Thread Methods, Thread Priority, Synchronization, Implementing runnable interface, Thread scheduling.

I/O Streams: File, Streams, Advantages, The stream classes, Byte streams, Character streams.

JDBC, ODBC Drivers, JDBC ODBC Bridges, Seven Steps to JDBC, Importing Java SQL Packages, Loading & Registering the drivers, Establishing connection. Creating & Executing the statement.

UNIT-V:

AWT Components and Event Handlers: Abstract window toolkit, Event Handlers, Event Listeners, AWT Controls and Event Handling: Labels, TextComponent, ActionEvent, Buttons, CheckBoxes, ItemEvent, Choice, Scrollbars, Layout Managers- Input Events, Menus, Programs

Design patterns - Introduction to Creational design patterns, Structural design patterns and Behavioural design patterns.

GUI Programming with Java - Introduction to Swing, limitations of AWT, Swing vs AWT, MVC architecture, Hierarchy for Swing components, Containers - JFrame, JApplet, JDialog, Jpanel. Overview of some swing components Jbutton, JLabel, JTextField, JtextArea, simple swing applications.

Text Books:

1. Java the complete reference, 7th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

References:

1. An Introduction to Programming and OO Design using Java, J.Nino and F.A. Hosch, John Wiley & Sons.
2. Introduction to Java Programming, Y. Daniel Liang, Pearson Education
3. An Introduction to Java Programming and Object Oriented Application Development, R.A. Johnson-Thompson
4. Programming with Java - E. Balagurusamy
5. Object-oriented Programming in Java - Dr G.Thampi
6. Let us Java – YashavantKanetkar - BPB Publications, New Delhi - First Edition 2012
7. Core Java, An Integrated Approach, Dr R. Nageswara Rao
8. An Introduction to Oops with Java - C Thomas WU - TataMc-Graw Hill, New Delhi - 4th Edition
9. Object-oriented Programming through Java - ISRD Group - TataMc-Graw Hill, New Delhi - Eight Reprint 2011

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
CS2804	Object Oriented Programming Lab					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	3	40	60	1.5

Course Objectives

1. To understand basic Java programming concepts and syntax.
2. To develop Java applications using control structures, arrays, and object-oriented programming concepts.
3. To implement Java applications using Strings, Wrapper classes, and file I/O.
4. To apply inheritance, polymorphism, and exception handling in Java programming.
5. To develop multi-threaded Java applications and understand the concept of threading.

Course Outcomes

1. Understand basic Java programming concepts and syntax, and Develop simple Java applications.
2. Use control structures and arrays in Java programs.
3. Implement object-oriented programming concepts in Java.
4. Develop Java applications using Strings and Wrapper classes.
5. Implement various types of inheritance, polymorphism and Use exception handling in Java.
6. Develop Java applications using file I/O.
7. Understand the concept of threading and implement multi-threaded Java applications.

Week-I

1. Write a Java program to print “Hello World”
2. Write a Java program that prints all real and imaginary solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, and c and use the quadratic formula
3. Write a Java program to implement calculator operations
4. Write a Java program to find prime factors of a given number
5. Write a Java program to find whether a given number is Palindrome or not
6. Write an application that declares 5 integers, and determines and prints the largest and smallest in the group.

Week-II

1. Write a Java program to sort a given list of numbers.
2. Write a Java program to implement linear search.
3. Write a Java program to implement binary search.
4. Write a Java program to add two given matrices.
5. Write a Java program to multiply two given matrices.
6. Write a Java program for sorting a given list of names.
7. Write a Java program to give an example for command line arguments

Week-III

1. Write a program to display details of the required employee based on his Id. The details of employees include Emp_name, Emp_age, Emp_gender, Emp_designation, Emp_salary, Emp_Address etc.

2. A mail-order house sells five products whose retail prices are as follows: Product 1: Rs. 99.90, Product 2: Rs. 20.20, Product 3: Rs. 6.87, Product 4: Rs. 45.50 and Product 5:Rs. 40.49. Each product has Prdouct_Id, Product_Name,Product_Quantity, Product_Price. Write an application that reads a series of pairs of numbers as follows:

    a. product Id

    b. quantity sold. your program should calculate and display the total retail value of all products sold

3. Write a Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value

4. Write a Java program: Roll a pair of dice 10 times [each attempt should be delayed by 10000 ms] and count the number of Successful attempts. successful attempt: If the pair of Dice results in the same values.

5. Implement the following case study using OOP concepts in Java. E-Book stall: Every book has Properties i.e. Book_Name, Book_Author, Book_Count; Every Customer has properties as Customer_Id, Customer_Name, Customer_Address and he can buy Books from the E-Book stall by giving book name, author name and the number of books he/she wants to buy. Write a Program which will display the list of books bought by the customer and the remaining textbooks in the E-book stall with the count.

Week -IV:

1. Write an application that uses the String method *"compareTo"* to compare two strings defined by the user.
2. Write an application that uses the String method equals and equalsIgnoreCase to test any two string objects for equality.
3. Write an application that uses the String method indexOf to determine the total number of occurrences of any given alphabet in a defined text.
4. Write an application that uses the String method concat to concatenate two defined strings
5. Write a Java program to print all vowels in a given string and count the number of vowels and consonants present in a given string
6. Write an application that finds the length of a given string.
7. Write an application that uses the String method charAt to reverse the string.
8. Write an application that finds the substring from any given string using the substring method and startsWith & endsWith methods.
9. Write an application that changes any given string with uppercase letters, displays it, changes it back to lowercase letters and displays it.

Week-V

1. Write a Java Program to implement Wrapper classes and their methods.
2. Write an application that prompts the user for the radius of a circle and uses a method called circleArea to calculate the area of the circle and uses a method circlePerimeter to calculate the perimeter of the circle.
3. Write a JAVA program for the following.
    a. Call by value
    b. Call by object
4. Create a class Account with an instance variable balance (double). It should contain a constructor that initializes the balance, ensuring that the initial balance is greater than 0.0. Acct details: Acct_Name, Acct_acctno, Acct_Bal, Acct_Address.Create two methods

namely credit and debit, getBalance. The Credit adds the amount (passed as a parameter) to the balance and does not return any data. The debit method withdraws money from an Account. GetBalance displays the amount. Ensure that the debit amount does not exceed the Account's balance. In that case, the balance should be left unchanged and the method should print a message indicating"Debit amount exceeded account balance".

5. Write a Java program for the following

    a. Example for this operator and the use of this keyword.

    b. Example for super keywords.

    c. Example for static variables and methods.

Week-VI

1. Write a Java program to find the Area and Circle of different shapes using polymorphism concept

2. Write a Java program which can give an example of Method overloading and overriding

3. Write an application to create a superclass Employee with information on first name & last name and methods getFirstName(), getLastName() derive the subclasses ContractEmployee and RegularEmployee with the information about department, designation & method displayFullName(), getDepartment(), getDesig() to print the salary and to set department name & designation of the corresponding sub-class objects respectively.

4. Derive sub-classes of ContractEmployee namely HourlyEmployee & WeeklyEmployee with information number of hours & wages per hour, number of weeks & wages per week respectively & method calculateWages() to calculate their monthly salary. Also, override the getDesig () method depending on the type of contract employee.

5. Write an application to create a superclass Vehicle with an information vehicle number, insurance number, colour and methods getConsumption() displayConsumption(). Derive the sub-classes TwoWheeler and FourWheeler with method maintenance() and average() to print the maintenance And average of the vehicle.

6. Extend the above Two Wheeler class with methods getType() and getName() which gives information about the type and the name of the company. Crea sub-classes Geared and Non Geared with method average() to print the average of a geared and non-geared two-wheeler.

Week-VII

1. Create an abstract class Shape which calculates the area and volume of 2-d and 3-d shapes with methods getArea() and getVolume(). Reuse this class to calculate the area and volume of a square, circle, cube and sphere.

2. Create an abstract class Employee with methods getAmount() which displays the amount paid to employees. Reuse this class to calculate the amount to be paid to WeeklyEmployee and HourlyEmployee according to the no. of hours for HourlyEmployee and no. of weeks for WeeklyEmployee.

3. Create an Interface payable with the method getAmount (). Calculate the amount to be paid to Invoice and Employee by implementing Interface.

4. Create an Interface Vehicle with methods getColor(),getNumber(), and getConsumption() to calculate the fuel consumed, name and colour for TwoWheeler and Four Wheeler By implementing interface Vehicle.

5. Create an Interface Fare with the method getAmount() to get the amount paid for a fare of travelling. Calculate the fare paid by bus and train to implement interface Fare.

6. Create an Interface StudentFee with methods getAmount(), getFirstName(), getLastName() , getAddress(), getContact(). Calculate the amount paid by the Hostler and Non-Hostler students by implementing the interface Student Fee

Week-VIII

1. Write a Program to create your own package. The package should have more than two classes. write a program that uses the classes from the package.

2. Create a package named org.shapes. Create some classes in the package representing some common geometric shapes like Squares, triangles, circles and so on. write a program that uses the classes from the package.

3. Write a Java program to create a package called dept. Create four classes as CSE, ECE, ME and CE adds methods in each class which can display the subject names of your respective year. access this package classes from main class

4. Write a Calculator program: Include all calculator operations as classes in a Package "Calculator" and import it to the main class.

5. 5. Write a program for the following

    a. Example to use interfaces in Packages.

b. Example to create a sub-package in a package

Week-IX

1. Write a program to create MyThread class with the run() method and then attach a thread to this MyThread class object.
2. Write a program where the consumer thread checks the data production status [is over or not] for every 10 ms.
3. Write a Program using Threads to simulate a traffic light. The Signal lights should glow after every 10 seconds, one by one. For example Firstly Red, then after 10 seconds, red will be put off and yellow will start glowing and then accordingly green.
4. Write a Program using Threads for the following case study: Movie Theatre To watch a movie the following process is to be followed, at first get the ticket then show the ticket. Assume that N persons are trying to enter the Theatre hall all at once, displaying their sequence of entry into the theatre. Note: The person should enter only after getting a ticket and showing it to the boy.
5. Write a Program using Threads for the following case study: Train Reservation system To reserve a berth the following process needs to be followed, at first check the number of available berths with the requested berths, if the number of requested berths is less than or equal to available berths then allot berth and print ticket or else display no berths are available. Assume that N persons are trying to reserve the berth, display their sequence of reservation status along with the number of available berths. Note: The person can print the ticket only if the berth is confirmed.

Week-X

1. Write a program for the following

   a. display a frame with the title MyFrame

   b. draw a horizontal line.

   c. Draw one line perpendicular to the other. One line is parallel to the other.

2. Create an application to display a circle within the rectangle and fill in different colours in the circle & rectangle
3. Write an application that displays any string. Choose a colour from the combo box to change the colour of this displayed string and choose its size & type respectively from another two combo boxes.
4. Create a GUI with the title STUDENT which has labels roll no., name, course, gender, class, and address with textboxes for taking input from the user(without any

functionality) and checkboxes for selecting the course, radio buttons for selecting gender with an appropriate background colour.

Week-XI

1. Write a program to create a frame by creating an object to Jframe class and include a close button to terminate the application of the frame.
2. Write a program to create a push button, when the button is clicked an image is displayed in the frame.
3. Write a program to create a menu with several menu items.
4. Create an application Form for University Enrollment with the following Fields.
    a. Check box
    b. Text area
    c. List box
    d. Display text
    e. Push buttons
    f. Combo box.
    g. Radio buttons.
    h. Background colour

Week-XII

1. Write a program to insert data into the Student Table.

2. Write a program to retrieve the data from the table Student.

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
EE2205	Control Systems (CS)					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- To familiarize the students with the need for modelling of systems and to represent the system in various ways mathematically.
- To teach them the various well-established techniques to analyze the stability of systems and related issues.
- Ability to find time response of given control system model & plot Root Locus and Bode Plots for given control system model
- Ability to design Lead, Lag, and Lead-Lag systems in control system & Ability to design PID controllers for given control system model.
- Ability to learn state space analysis and optimal control systems.

Course Outcomes

1. To narrate the basic features of Open Loop and Closed Loop control systems, illustrate the physical and electrical systems and formulate their transfer function.
2. To categorize first-order and second-order systems and examine their time domain responses for different inputs and analyze the transfer function of proportional (P), proportional plus derivative (PD), proportional plus integral (PI), and proportional plus derivative plus integral controllers(PID).
3. To define the concept of stability and analyze the system stability using RH criteria and the Root Locus technique.
4. To assess the stability in the frequency domain using Bode, and Nyquist plots and develop compensators to meet given frequency domain specifications.
5. To define the basic concepts of state variable analysis, derive state equations and establish transfer functions for a given system and discuss their controllability and observability. To define the basics of a Digital control system and its Transfer function.

UNIT-I: INTRODUCTION

Concepts of Control Systems- Open Loop and closed-loop control systems and their differences- Examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of Feedback, Mathematical modelling of physical systems: Differential equation and

Transfer functions, Examples of modelling different types (e.g. electrical, mechanical, chemical, biological, social etc.) of systems, Equivalence between the elements of different types of systems. Block diagram algebra –Signal flow graph -Reduction using Mason‘s gain formula. Translational and rotational mechanical systems.

UNIT-II: TIME DOMAIN ANALYSIS

Standard test signals - Time response of first-order systems –Characteristic Equation of Feedback control systems, Transient response of second-order systems - Time domain specifications. Steady-state response - Steady-state errors and error constants, Frequency domain response – Transfer function and its interpretation in terms of frequency responses peak and peaking frequency, bandwidth and cut-off rate; Link between time and frequency domain response features. Advantages of closed loop operation: Sensitivity and complementary sensitivity, Disturbance and noise reduction.

UNIT-III: STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh‘s stability criterion– qualitative stability and conditional stability–limitations of Routh‘s stability. The root locus concept - construction of root loci- and relative stability using the root-locus approach, effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT-IV: FREQUENCY DOMAIN ANALYSIS

Polar Plots-Nyquist Plots-Stability Analysis. Bode diagrams- Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain Margin-Stability Analysis from Bode Plots. P, PD, PI, PID Controllers and Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain.

UNIT-V: STATE VARIABLE ANALYSIS

State variable Analysis- Concepts of state, state variable, state model, state models for linear continuous-time functions, diagonalization of the transfer function, solution of state equations, the concept of controllability & observability. Introduction to Optimal Control & Nonlinear control, Optimal Control problem, Regulator problem, Output regulator, trekking problem. Nonlinear system – Basic concept & analysis**.**

Text Books:

1. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John Wiley and Sons, 8th edition, 2003.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.

References:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering - by NISE 5th Edition – John Wiley.
3. M. Gopal, Control Systems Principles and Design, 4th edition, Tata McGraw-Hill,2012.
4. A.Nagoorkani, Control Systems, 3rd Edition, RBA Publications, 2017.
5. A K. Jairath, Solutions and Problems of Control Systems, 7th edition, CBS publications and distributors,2021.

Online Resources:

1. Control Engineering, Dr Rama Krishna Pasumarthy, Associate Professor, IIT Madras. https://nptel.ac.in/courses/108106098/
2. ControlEngineering, Prof.S.D.Agashe,Professor,IITBombay. https://www.digimat.in/nptel/courses/video/108101037/L01.html

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
EC2201	Analog Circuits (AC)					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	1	0	40	60	4

Course Objectives

- The concepts of small signal equivalent circuits of BJT, FET and their frequency response.
- The concept of multistage amplifiers, differential amplifiers and current mirrors for high input impedance.
- The fundamental concepts of positive and negative feedback and their applications.
- The performance analysis of Operational amplifiers and their applications.
- The concept of large signal amplifiers and radio frequency amplifiers.

Course Outcomes

1. An ability to design and analyze the BJT & FET amplifiers at low-frequency, mid-frequency and high-frequency regions.
2. An ability to analyze a given differential amplifier or design a differential amplifier to meet the given specifications with a constant current bias circuit.
3. An ability to design and analyze the positive feedback and negative feedback amplifiers for a given specification.
4. An ability to design and perform op-amp-based circuits and their applications for a given specification.
5. An ability to understand the large signal amplifiers (i.e. power amplifiers) and their efficiency calculations.
6. An ability to understand the waveform generators, timers and analog to digital converters & digital to analog converters

UNIT-I

Small Signal Analysis: Amplifier models: Voltage amplifier, current amplifier, transconductance amplifier and trans-resistance amplifier. Biassing schemes for BJT and FET amplifiers, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small

signal analysis, low-frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications

High-Frequency Analysis: High-frequency transistor models, the frequency response of single-stage and multistage amplifiers, cascade amplifiers.

UNIT-II

Power Amplifiers: Various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues.

Feedback topologies: Voltage series, current series, voltage shunt, current shunt, the effect of feedback on gain, bandwidth etc., calculation with practical circuits.

UNIT-III

Oscillators: Review of the basic concepts, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators.

Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load.

Differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR.

UNIT-IV

OP-AMP: Introduction of op-amp and its internal circuit diagram. Ideal and practical op-amp with transfer characteristics.

OP-AMP applications: Review of inverting and non-inverting amplifiers, virtual ground concept. Linear op-amps (Adders, Subtractors, V-V, V-I, I-V, I-I amplifiers, Instrumentation amplifier); Non-linear op-amps (Rectifiers, Peak detector, Clipper, Clamper, Logarithmic amplifier) and multipliers; Open loop op-amps (Comparator, Detector); Positive Feedback op-amps (Schmitt trigger, Multivibrators)

Active filters Design: Low pass, high pass, band pass and band stop, design guidelines.

UNIT-V

Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc.

Analog-to-digital converters(ADC): Single slope, dual slope, successive approximation, flash etc

Text Books:

1. Electronics Devices and Circuit Theory Boylestad, Robert & Louis, Nashelsky Pearson, 10th Edition
2. Microelectronic Circuits-Theory and Applications by Adel S. Sedra and Kenneth C. Smith, Fifth Edition, (Oxford International Student Edition)

References:

1. Electronic Devices and Circuits- Millman and Halkias, TMH
2. Op-Amps and Linear Integrated Circuits Gayakwad, Ramakant A PHI, Learning, 4th Edition Electronic Devices and Circuits Dr Sharma, Sanjay KATSON,2012
3. Fundamentals of Electronic Devices and Circuits David, A Bell Oxford Press, 5thEdition, 2008
4. Electronic Principles - with Simulation CD Malvino, A.P. Tata McGraw- Hill, Education, 7 thEdition
5. Basic Electronics and Linear Circuits Bhargava, N., Kulshreshtha D., S.Gupta Tata McGraw- Hill Education, 2011
6. Electronics Devices and Circuits Mottershead, Allen PHI Learning, 2011
7. Electronic Devices and Circuits- David A Bell - PHI 4th edition

Online Resources:

1. https://www.mooc-list.com/course/electronic-systems-and-digitalelectronics-uninettuno?static=true
2. http://ocw.mit.edu/courses/electrical-engineering-and-computerscience/6-012-microelectronic-devices-and-circuits-spring-2009
3. Introductory Analog Electronics Laboratory (Spring 2007) by MIT OpenCourseWare

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
EC2801	ANALOG CIRCUITS LAB					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	40	60	1

Course Objectives

- To design and Characterize small-signal equivalent circuits of BJT, FET and its frequency response.
- To design differential amplifiers & differential amplifiers with active load and its frequency response.
- To design a simple current mirror circuit using BJT and MOSFET.
- To design a cascode current mirror circuit using BJT and MOSFET.
- To design the positive feedback amplifiers for a given specifications and tuned amplifiers & timers.

Course Outcomes

1. An ability to design and Characterize small-signal equivalent circuits of BJT, FET and its frequency response.
2. An ability to design differential amplifiers & differential amplifiers with active load and its frequency response.
3. An ability to design simple current mirror circuits using BJT and MOSFET.
4. An ability to design cascode current mirror circuits using BJT and MOSFET.
5. An ability to design the positive and negative feedback amplifiers for given specifications and tuned amplifiers & timers.

List of Experiments:

SECTION-A

1. Clipping and Clamping circuits.
2. LC, CLC filters
3. Voltage Regulators.
4. RC-coupled amplifier (single stage & two-stage).
5. Darlington Emitter follower & Tuned voltage amplifier.
6. Power amplifiers (Class-B push-pull power amplifier).
7. Feedback amplifiers:

(i) Voltage series feedback amplifier
(ii) Voltage shunt feedback amplifier
(iii)Current shunt feedback amplifier
(iv)Current series feedback amplifier

8. Oscillators:
   (i) RC-phase shift oscillator
   (ii) Wein-bridge oscillator
   (iii)Hartley oscillator

SECTION-B

Operational Amplifiers

1. Parameters of Operational Amplifiers.
   (i) Input bias current, Input Offset current, Input Offset voltage
   (ii) Common Mode Rejection Ratio (CMRR)

2. Applications of Operational Amplifiers.
   (i) Inverting op-amp & Non-Inverting op-amp
   (ii) Voltage follower, Summing amplifier
   (iii)ZCD, Schmitt trigger
   (iv)Full-wave precision rectifier etc.
3. Waveform generators by using op-amp
   (i) Monostable Multivibrator
   (ii) Astable Multi vibrator

Text Books:

1. Electronics Devices and Circuit Theory Boylestad, Robert & Louis, Nashelsky Pearson, 10th Edition
2. Microelectronic Circuits-Theory and Applications by Adel S. Sedra and Kenneth C. Smith, Fifth Edition, (Oxford International Student Edition)
3. Electronic Devices and Circuits- Millman and Halkias, TMH
4. Op-Amps and Linear Integrated Circuits Gayakwad, Ramakant A PHI, Learning, 4th Edition Electronic Devices and Circuits Dr Sharma, Sanjay KATSON,2012

References:

1. Fundamentals of Electronic Devices and Circuits David, A Bell Oxford Press, 5thEdition, 2008
2. Electronic Principles - with Simulation CD Malvino, A.P. Tata McGraw- Hill, Education,7 thEdition
3. Basic Electronics and Linear Circuits Bhargava, N., Kulshreshtha D., S.Gupta Tata McGraw- Hill Education, 2011
4. Electronics Devices and Circuits Mottershead, Allen PHI Learning,2011
5. Electronic Devices and Circuits- David A Bell - PHI 4th edition

Online Resources:

1. https://www.mooc-list.com/course/electronic-systems-and-digitalelectronics-uninettuno?static=true

2. http://ocw.mit.edu/courses/electrical-engineering-and-computerscience/6-012-microelectronic-devices-and-circuits-spring-2009/
3. Introductory Analog Electronics Laboratory (Spring 2007) by MIT OpenCourseware.

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
EC2203	Electromagnetic Waves (EMW)					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To familiarize the students with the importance of transmission lines
- To teach them the various engineering graphical tools to design transmission lines
- To understand the importance of maxwell's equations in electromagnetic fields
- To understand the importance of electromagnetic waves in wireless communications
- Ability to learn the waveguides and antenna basics

Course Outcomes

1. Understand characteristics and wave propagation on high-frequency transmission lines
2. Carryout impedance transformation on TL
3. Use sections of transmission line sections for realizing circuit elements
4. Characterize uniform plane wave
5. Calculate reflection and transmission of waves at media interface
6. Analyze wave propagation on metallic waveguides in modal form
7. Understand the principle of radiation and radiation characteristics of an antenna

Unit I: INTRODUCTION TO TRANSMISSION LINES

Concept of distributed elements, equations of voltage and current, standing waves and impedance transformation, lossless and low loss transmission lines, power transfer on a transmission line, short circuit and open circuit lines, parameters of the transmission line.

SMITH CHART: applications, applications of transmission line, impedance matching using transmission lines.

Unit II: BASIC LAWS OF ELECTROMAGNETICS

Gauss's law, Ampere's circuital law, Faraday's law of electromagnetic induction.
Maxwell's equations: Surface charge and Surface current, Displacement current and continuity equation, Boundary conditions at media interface.

Unit III: UNIFORM PLANE WAVES I

Wave equation for time-harmonic fields, Solution of the wave equation, Uniform plane wave, Wave polarization, Wave propagation in conducting medium, Phase velocity and Poynting vector

Uniform plane waves II: Plane wave in an arbitrary direction, Reflection and refraction of waves at dielectric and conducting interface, Total internal reflection, Brewster angle.

Unit IV: WAVE GUIDES

Parallel plane waveguide, TE mode, TM mode, TEM mode,

Rectangular waveguides: Group velocity and dispersion, Analysis of rectangular waveguides.

Unit V: ANTENNAS

Introduction, Radiation parameters of antenna, potential functions and their solutions.

FIELDS: Near and far fields, Radiation resistance and radiation pattern of Hertz dipole, total power radiated by a dipole.

Text Books:

1. M.N.O. Sadiku, "Principles of Electromagnetics", Oxford University Press, 2009.
2. R.K. Shevgaonkar, "Electromagnetic Waves", Tata McGraw Hill, 2005.

References:

1. C.A. Balanis, "Advanced Engineering Electromagnetics", John Wiley and Sons, 2012.
2. D. K. Cheng, "Field and Wave Electromagnetics", Addison-Wesley, 1989.
3. C. A. Balanis, "Antenna Theory: Analysis and Design", John Wiley and Sons,2005

Online resources:

1. https://youtube.com/playlist?list=PLQzh033j0lVKTC5vOQ0E0njh6UV8M1UR4
2. https://youtube.com/playlist?list=PLuv3GM6-gsE3-hVNaw-YEb7EeY5XVPZdz
3. https://youtube.com/playlist?list=PL0925FD10648D664E

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
EC2202	Digital Systems Design (DSD)					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To learn the Hardware Description Language (HDL) to design the digital systems
- To learn the various concepts of timing parameters and its effects on digital systems.
- To learn the controller and datapath designs of digital systems.
- To understand the structure of FPGAs.

Course Outcomes

1. Students will be able to understand the basic concepts of Verilog Hardware Description Language.
2. Students will be able to understand the concepts of timing constraints of digital systems.
3. Students will understand the steps to follow to design digital systems.
4. Students will understand the concepts to design the controller and data path of digital systems.
5. Students will understand the structure of programmable logic devices like FPGAs**.**

UNIT-I: Introduction to Verilog

Evolution of CAD tools, Overview of Design Flow, Modeling Concepts, Modules and Ports, Different Abstractions-Gate level, Dataflow, Behavioral, Tasks and Functions, Useful Modelling Techniques

UNIT-II: Advanced Verilog

Timings and Delays, clocking of Flip Flops- effect of Propagation delay by considering timing constraints, clock skew, Global Setup and Hold time.

UNIT-III: Basic systems design

Review of FSM- Mealy, Moore Machines, State graphs, State tables, Design of pattern identification, Hardware realizations- Sequential logic, combinational logic and Verilog Modelling, One hot controller-vending machine, Hardware realizations and Verilog Modeling.

UNIT-IV: Sophisticated designs
ASM-components, Meelay, Moore ASM, Bus Arbiter, Traffic Light Controller, Dice Game, Microprogramming techniques-SQDA, SQSA for Dice Game

UNIT-V: FPGA architectures –Programmable logic devices –Spartan 6 FPGA Block Diagram and Structure.

Text Books:

1. Verilog HDL: A Guide to Digital Design and Synthesis - Samir Palnitkar, Prentice Hall, Second Edition, 2003.
2. Digital Design: Principles and Practices - John F Wakerly, Pearson, Fourth Edition, 2007.

References:

1. Digital Design and Verilog HDL Fundamentals – Joseph Cavanagh, CRC Press, 2008.

Online Resources:

1. https://youtu.be/Y8FvvzcocT4, Digital VLSI System Design, Lecture Series on VLSI
2. Design by Prof S.Srinivasan, Dept of Electrical Engineering, IIT Madras

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
EC2802	DIGITAL SYSTEM DESIGN AND VLSI LAB					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	40	60	1

Course Objectives

- Familiarize with VLSI CAD tools like Xilinx 14.4 and Mentor Graphics tools.
- Gives Basic concepts of Verilog HDL code to write code for digital circuits.
- To have hands-on experience to design digital circuits, simulate and synthesise the design with Xilinx 14.4 VLSI CAD tool with timing diagrams and RTL diagrams.
- To have hands-on experience for transistor level design and simulate it with transient and dc analysis using mentor Graphics tool.
- FPGA implantation of the Verilog code written in the VLSI CAD tool.

Course Outcomes

1. Able to write a Verilog HDL code for the digital systems.
2. Able to use the VLSI CAD tools to design digital systems and get synthesis the design to get RTL-level diagrams.
3. Able to simulate the digital system to check the functionality with the timing diagrams.
4. Able to do transient and dc analysis of the CMOS Inverter, Logic gates and analog circuits.
5. Able to do FPGA Implementation of the combinational and sequential circuits.

LIST OF EXPERIMENTS:

1. Familiarization with Xilinx 14.4 tool.
2. Simulate and Synthesis of all basic gates.
3. Simulate and synthesise multiplexers, decoders and code converters.
4. Simulate and synthesis all flip-flops.
5. Simulate and synthesis of Universal shift register.
6. Simulate and synthesis the binary counter, and MOD counters.
7. FPGA implementation of basic gates and binary counters.
8. Familiarization with the mentor Graphic tool for transistor-level design.
9. Design and synthesis of a CMOS amplifier
10. Transient and DC analysis of CMOS inverter.
11. Transient, DC and power analysis of the NAND and NOR gates using CMOS implementation.
12. Transient, DC and power analysis of the XOR gates using NAND gates cells.
13. Transient, DC and power analysis of the 2x1 MUX using NAND gates cell

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title					Course Type
BS2201	**Environmental Science (ES)**					MC
Prerequisite	**Contact Hours per Week**			**Internal**	**External**	**Credits**
	L	**T**	**P**			
	2	0	0	40	60	0

Course Objectives

- To introduce students to the multidisciplinary nature of environmental studies and its scope and importance.
- To create awareness among students about the need for conservation and sustainable use of natural resources.
- To educate students about the structure, function, and value of ecosystems and biodiversity, as well as the threats they face and methods for their conservation.
- To familiarize students with the causes, effects, and control measures of different types of pollution and the legal framework for environmental protection.
- To sensitize students to the social issues related to the environment and their role in promoting sustainable development.

Course Outcomes

1. Students will be able to understand the complex interrelationships between different components of the environment and their impact on human well-being.
2. Students will develop an appreciation for the importance of conservation and sustainable use of natural resources and become aware of their individual and collective responsibilities towards the environment.
3. Students will be able to understand the functioning of different ecosystems and their role in maintaining the ecological balance.
4. Students will be able to identify different types of pollution and their causes, effects, and control measures, and develop an understanding of the legal framework for environmental protection.
5. Students will become aware of the social issues related to the environment and the role of education, technology, and individual actions in promoting sustainable development.

UNIT I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, scope and importance, need for public awareness.

UNIT II: NATURAL RESOURCES

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, and use of alternate energy sources.

f) Land resources: Land as a resource, land degradation, man-induced landslides, soil erosion and desertification.

- Role of an individual in the conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT III: ECOSYSTEMS & BIODIVERSITY

Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flows in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystems:-

a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem, d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
b. Biodiversity- Definition: genetic, species and ecosystem diversity. Biogeographical classification of India Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
c. Biodiversity at global, National and local levels. India is a mega-diversity nation with Hot-sports biodiversity.

d. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT IV: ENVIRONMENTAL POLLUTION

Definition, Cause, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, and Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Disaster management: floods, earthquakes, cyclones and landslides.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and the holocaust. Case Studies.
- Environment Protection Act., Air (Prevention and Control of Pollution) Act. Water Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

UNIT V: SOCIAL ISSUES & THE ENVIRONMENT

Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

Fieldwork:

Visit a local area to document environmental assets: river/forest/grassland/hill/mountainVisit a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds. Study of simple ecosystems-pond, river, hill slopes, etc.

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad-380013, India, Email:mapin@icenet.net (R)
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorham i, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R)

8. Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R) j) Heywood, V.H &Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
10. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
11. Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web-enhanced edition. 639p.
12. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
13. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
14. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
15. Rao M N. & Datta, A.K. 1987. Wastewater treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
16. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
17. Survey of the Environment, The Hindu (M)
18. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science.
19. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).
20. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB).
21. Wagner K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (M) Magazine (R) Reference (TB) Textbook Members of the Expert Committee on Environmental Studies.

★ Prof. ErachBharucha, Director Bharati Vidyapeeth, Institute of Environment Education & Research, Pune

★ Prof. C. Manoharachary Department of Botany Osmania University Hyderabad

★ Prof. S. Thayumanavan Director Centre for Environmental Studies Anna University, Chennai

★ Prof. D.C. Goswami Head, Dept. Of Environment Science Gauhati University Guwahati-781014

★ Shri R. Mehta Director EE Division Ministry of Environment & Forest Prayavaran Bhawan, CGO Complex Lodhi Road, New Delhi-110 003 UGC OFFICIALS

★ Dr N. K. Jain Joint Secretary UGC, New Delhi

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
CS3204	COMPUTER NETWORKS (CN)					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To Introduce The Fundamental Various Types Of Computer Networks.
- To Demonstrate The TCP/IP And OSI Models With Merits And Demerits.
- To Introduce UDP And TCP Models.

Course Outcomes

1. Understand the fundamental concepts and principles of data communication and computer networking.
2. Learn data transmission media, data link layer protocols, and error detection and control.
3. Analyze multiplexing techniques, multi-access protocols, and switching technologies.
4. Gain knowledge about network layer design, routing algorithms, and internetworking.
5. Learn transport layer protocols, including TCP and UDP, and application layer protocols such as HTTP, FTP, DNS, and SMTP

UNIT - I:

Introduction- Hardware And Software, Data Communication, Networking, Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet History Standards And Administration; Comparison Of The OSI And TCP/IP Reference Model, Digital And Analog Data And Signals.

Physical Layer: Guided Transmission Media, Wireless Transmission Media.

Data Link Layer: Design Issues, CRC Codes, Elementary Data Link Layer Protocols, Sliding Window Protocol, Flow Control. Error Detection And Error Control. HDLC And other Data Link Protocols.

UNIT - II:

Bandwidth Utilization: Multiplexing – Frequency-Division, Synchronous Time-Division, And Statistical Time-Division Multiplexing.

Multi-Access Protocols: ALOHA, CSMA, Collision Free Protocols, Ethernet- Physical Layer, Ethernet Mac Sublayer, Data Link Layer Switching & Use Of Bridges, Learning Bridges, Spanning Tree Bridges, Repeaters, Hubs, Bridges, Switches, Routers And Gateways.

UNIT-III:

Network Layer: Network Layer Design Issues, Store And Forward Packet Switching Connection Less And Connection Oriented Networks-Routing Algorithms-Optimality Principle, Shortest Path, Flooding, Distance Vector Routing, Control To Infinity Problem, Hierarchical Routing, Congestion Control Algorithms, Admission Control.

UNIT-IV: Internetworking: Tunneling, Internetwork Routing, Packet Fragmentation, Ipv4, Ipv6 Protocol, IP Addresses, CIDR, IMCP, BOOTP, ARP, RARP, DHCP, Network Address Translation (NAT) Internetworking

Transport Layer: TCP Introduction, Reliable/Un- Reliable Transport, Connection Establishment, Connection Release, Crash Recovery, Intra-Domain Routing: Distance-Vector, Intra-Domain Routing: Link- State, Wireless Networks: 802.11 MAC, Efficiency Considerations

UNIT-V: The Internet Transport Protocols: UDP-RPC, Real-Time Transport Protocols, The Internet Transport Protocols- Introduction To TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The Future Of TCP.

Application Layer: Introduction, Providing Services, Applications Layer Paradigms, Client Server Model, Standard Client-Server Application-HTTP, FTP, Electronic Mail, TELNET, DNS, SSH, SNMP, WWW.

Text Books:

1. Computer Networks, by Andrew s Tanenbaum, PHI(2010)
2. Data and Computer Communications, by William Stallings, PHI(2002)

References:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.
3. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education.
4. Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.
5. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.
6. Computer Networks, L. L. Peterson and B. S. Davie, 4th edition, ELSEVIER.
7. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Education.

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
CS3205	OPERATING SYSTEMS (OS)					ESC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS
- To gain knowledge on distributed operating system concepts that include architecture,
- Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects of concurrency management.

Course Outcomes

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement a file management system.
5. For a given I/O device and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Unit I:

Introduction: Concept of Operating Systems, Generations of Operating Systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS – Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine.

Unit II:

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multi threads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization,

Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non-pre-emptive, FCFS, SJF, RR

Unit III:

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer-Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc. Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Unit IV:

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

Unit V:

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device-independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

Textbooks:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

References:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
EC3201	MICROPROCESSOR AND MICROCONTROLLERS					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To illustrate various types of processors available in the market with their features.
- To illustrate the architecture of 8086 microprocessor and microcontroller 8051.
- To introduce the programming and interfacing techniques to the 8086 microprocessor.
- To analyze the basic concepts and programming of the 8051 microcontrollers.
- To understand the interfacing circuits for various applications of the 8051 microcontrollers.

Course Outcomes

1. Describe the architecture of 8085, 8051 and 8086.
2. Illustrate the organization of registers and memory in microprocessors.
3. Identify the addressing mode of instruction.
4. Develop programming skills in assembly language.
5. Explain the need for different interfacing devices

Unit 1: Architecture of Microprocessors:

General definitions of minicomputers, microprocessors, microcontrollers and digital signal processors. CISC Vs RISC and ARM processors, Overview of 8085 microprocessors.

Unit 2: Architecture and Assembly language of 8086:

Architecture, memory segmentation, signals and pins of 8086 microprocessors. Assembly directives, Addressing modes, Description of Instructions and Assembly software programs with algorithms.

Unit 3: Interfacing with 8086:

Interfacing with peripheral ICs like 8255-PPI, 8237-DMA controller, 8259- Programmable Interrupt Controller, Interfacing with keyboards, LEDs, LCDs, ADCs, and DACs etc.

Unit 4: Microcontroller 8051:

Overview of the architecture of 8051 microcontrollers, Description of Instructions. Assembly directives. Assembly software programs with Algorithms.

Unit 5: Interfacing with 8051:

Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs and DACs, stepper motor etc.

Text Books:

1. Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
2. Kenneth J. Ayala, The 8051 Microcontroller, Penram International Publishing, 1996.

References:

1. R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing, 1996
2. D A Patterson and J H Hennessy, "Computer Organization and Design The Hardware and software interface. Morgan Kaufman Publishers.

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
EC3801	MICROPROCESSOR LAB					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	40	60	1

Course Objectives

- To Expose the students to hardware kits and dumping tools
- To prepare the students for the interfacing procedure of various I/O devices
- To expose the students to various actuation motors and their modes of operation.
- To Prepare the students to design for day-to-day applications such as TLC and Elevator systems.
- To understand the practical usage of ADCs and DACs

Course Outcomes

1. Ability to understand the hardware kits and way of dumping the program in IC.
2. Gain knowledge of various input and display output devices and their interfacing to µc-8051.
3. Understanding of various motors and ability to interface with microcontrollers in various modes.
4. Ability to design and demonstrate various applications such as traffic light controllers and elevator control.
5. Understanding the interfacing of ADCs and DACs and various analog sensors.

List of Experiments:

Familiarization with TITAN II Kit's hardware and usage of Triton IDE along with Flash Magic for dumping the code to the controller by blinking on board LEDs.

1. Interface a simple seven-segment LED display with the controller.
2. To Display "DEPT OF ECE" on LCD in 8-bit as well as 4-bit mode
3. Interface Keyboard and LCD with the controller.
4. Interface Stepper Motor by controlling its direction and making it spin faster or slower.
5. Interface the DC motor and control its speed using the PWM technique.
6. Design, program and implementTraffic a Light system using a microcontroller. (prefer the design on the breadboard)
7. Design, program and implement Elevator system using a microcontroller. (prefer the design on the breadboard)
8. Interfacing ADC to Microcontroller.

9. Interface DAC with Microcontroller and generate multiple waveforms.
10. Interface Temperature Sensor to ADC and measure it on LCD with microcontroller.

Text Books:

1. Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
2. Kenneth J. Ayala, The 8051 Microcontroller, Penram International Publishing, 1996.

References:

1. R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing, 1996
2. D A Patterson and J H Hennessy, "Computer Organization and Design The Hardware and software interface. Morgan Kaufman Publishers.

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
EC3202	RF AND MICROWAVE ENGINEERING (RFMW)					PCC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- To prepare students to understand the basic principle of microwave and its applications.
- To prepare students to understand different microwave components and analyse different types of junctions used in microwave engineering.
- To teach the students about various microwave solid-state devices and their characteristics.
- To understand and gain complete knowledge about RF basic concepts, and RF filter design.
- To understand and gain complete knowledge about RF amplifier design.

Course Outcomes

1. Able to calculate cut-off frequency, identify possible modes and obtain mode characteristics of Reflex Klystron and Gunn oscillator.
2. understand the principles of operation of the waveguide, gyrator, isolator attenuator etc. and obtain scattering matrix for various junctions like E-plane, H plane, Circulator, and Direction Coupler.
3. Analyze and design basic microwave amplifiers, particularly klystrons, magnetrons, RF filters, basic RF oscillators and mixer models.
4. Become proficient with microwave measurement of power, frequency and VSWR, impedance for the analysis and design of circuits.
5. Analyze T-R Module, microwave systems and microwave antennas.

UNIT-I: Introduction to Microwaves

History of Microwaves, Microwave Frequency bands; Applications of Microwaves: Civil and Military, Medical, EMI/ EMC.

Mathematical Model of Microwave Transmission: Concept of Mode, Features of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission.

UNIT-II: Analysis of RF and Microwave Transmission Lines

Coaxial line, Rectangular waveguide, Circular waveguide, Resonator, Strip line, Microstrip line.

Microwave Network Analysis: Equivalent voltages and currents for non-TEM lines, Network parameters for microwave circuits, Scattering Parameters.

UNIT-III: **Passive and Active Microwave Devices**

Microwave passive components: Directional Coupler, Power Divider, Magic Tee, Attenuator.

Microwave active components: Diodes, Transistors, Oscillators, Mixers. Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave Tubes: Klystron, TWT, Magnetron.

UNIT-IV: Microwave Design Principles

Impedance transformation, Impedance Matching, Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power Amplifier Design, Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design.

Microwave Antennas: Antenna parameters, Antenna for ground-based systems, Antennas for airborne and satellite-borne systems, and Planar Antennas.

UNIT-V: Microwave Measurements

Power, Frequency and impedance measurement at microwave frequency, Network Analyser and measurement of scattering parameters, Spectrum Analyser and measurement of the spectrum of a microwave signal, Noise at microwave frequency and measurement of noise figure. Measurement of Microwave antenna parameters.

Microwave Systems: Radar, Terrestrial and Satellite Communication, Radio Aids to Navigation, RFID, GPS. Modern Trends in Microwaves Engineering- Effect of Microwaves on the human body, Medical and Civil applications of microwaves, Electromagnetic interference and Electromagnetic Compatibility (EMI & EMC), Monolithic Microwave ICs, RFMEMS for microwave components, Microwave Imaging.

Text Books:

1. Microwave devices and circuits-Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Microwave principles-Herbert J.Reich, J.G.Skalnik, P.F.OrdungandH.L.Krauss, CBS publishers and distributors, New Delhi, 2004.

References:

1. Foundations for microwave engineering-R.E.Collin, IEEE press, John Wiley, 2nd edition, 2002.
2. Microwave circuits and passive devices-M.L.Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave engineering passive circuits-Peter A.Rizzi, PHI, 1999.
4. Electronic and Radio Engineering-F.E.Terman, McGraw-Hill, 4th Edition, 1995

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
EC3802	RF AND MICROWAVE ENGINEERING LAB					BSC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- The goal of this course is to introduce students to the concepts and principles of the advanced microwave engineering.
- To study the characteristics of RKO and Gunn oscillator.
- Measurement of frequency and wavelengths would be learnt by the student.
- VSWR various TEES, MHD and Circulator would be understood by the student.
- Radiation pattern would be learnt by the student for horn antenna.
- To study the usage of hand-held Vector Network Analyzer, Spectrum Analyzer, and Advanced Microwave Integrated Circuits.

Course Outcomes

1. Gain knowledge and understanding of microwave analysis methods.
2. Be able to apply analysis methods to determine circuit properties of passive/active microwave devices.
3. Analyze the characteristics of the RKO and Gunn oscillator.
4. Measure the frequency and guided wavelength.
5. Estimate the VSWR for various loads and S-Matrix for various microwave devices.
6. Obtain the horn antenna radiation pattern

List of Experiments:

SECTION-A

1. Study of a standing wave pattern.
2. Measurement of guide wavelength and frequency.
   (i) By using Frequency meter i.e. Direct Method
   (ii) By using Slotted line method i.e. Indirect Method
3. Repeller mode characteristics of Reflex klystron.
4. I-V characteristics of Gunn Diode.
5. Measurement of VSWR.
   (i) By using the Slotted line method (S<10)
   (ii) By using the Double minimum method (S>10)
6. Calibration of Crystal Detector.
7. Calibration of Attenuator (Fixed attenuation i.e. Power Ratio method).
8. Measurement of attenuator (Variable attenuation i.e. RF substitution method)

9. Measurement of unknown impedance.
   (i) By using the Load impedance formula
   (ii) By using Smith Chart
10. The radiation pattern of a horn antenna and parabolic dish antenna.

SECTION-B

Resonant Microwave Components

1. Introduction regarding S-parameters (Study Experiment).
2. Characteristics of Magic-Tee with the help of S-matrix and observe the phase difference with the help of CRO.
3. Characteristics of Directional Coupler.
   (i) Directivity
   (ii) Isolation
   (iii)Insertion loss
   (iv)Coupling Factor
   (v) S-matrix
   (vi)And Prove $P^2 + q^2 = 1$.

Non-Resonant Microwave components

4. Characteristics of Circulator (3-port).
   (ii) Find S-matrix
   (iii)Find VSWR
5. 4-port the Circulator by using two magic tees and one gyrator.
6. Characteristics of Isolator (By using Y-circulator)
   (i) Find S-matrix
   (ii) Find VSWR

Text Books:

1. Microwave devices and circuits-Samuel Y. Liao, Pearson, 3rd Edition, 2003.
2. Microwave principles-Herbert J.Reich, J.G.Skalnik, P.F.Ordung and H.L.Krauss, CBS publishers and distributors, New Delhi, 2004.
3. Microwave Engineering-David M. Pozar, fourth edition, john wiley & Sons Inc. publications.

References:

1. Foundations for microwave engineering- R.E.Collin, IEEE press, John Wiley, 2nd edition, 2002.
2. Microwave circuits and passive devices- M.L.Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave engineering passive circuits-Peter A.Rizzi, PHI, 1999.
4. Electronic and Radio Engineering-F.E.Terman, McGraw-Hill, 4th Edition, 1995.
5. Microwave and Radar engineering- Dr M. Kulakarni, Umesh publications, fifth edition, 2015

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
EC3212	MACHINE LEARNING TECHNIQUES					PEC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives:

- To introduce students to the basic concepts and classical techniques of Machine Learning.
- To study optimization algorithms used in Machine learning.
- To study various classification techniques, regression, clustering, and ANN.
- To study Deep learning concepts: CNN, RNN and hyperparameter tuning, some case studies.

Course Outcomes

1. Understand machine learning concepts and principles.
2. Apply machine learning algorithms to real-world problems.
3. Evaluate error metrics and optimize gradient descent algorithms.
4. Utilize neural networks for deep learning and computer vision.
5. Apply sequence modeling techniques and tune hyperparameters.

UNIT-I

Introduction to Machine Learning: Supervised learning, Unsupervised learning, Reinforcement learning. Machine Learning applied to AI examples. Structured data, Unstructured data, training data, test data, cross-validation, data collection (Unbiased data), data cleaning, feature extraction, and Properties of best features for classification. Linear Regression, Logistic Regression. Overfitting problem. Bias-Variance tradeoff.

UNIT-II

Error metrics, error metrics for skewed classes, Gradient Descent algorithms: Batch, mini-batch, Stochastic Gradient descent. Classification Techniques: Bayes classifier, Naïve Bayes classifier, K-Nearest neighbour, Perceptron learning algorithm, Multi-layer Perceptron, Regularization,

Support Vector Machines, Decision tree algorithm. Clustering: K-means clustering. Dimensionality Reduction, Anomaly detection.

UNIT-III

Introduction to Neural Networks**,** backpropagation algorithm. Activation functions: Sigmoid, tanh, ReLU, SoftMax. Regularization techniques.

UNIT-IV

Deep learning, vanishing gradients problem, Hyperparameters. CNN and applications to Computer Vision. Hyperparameter tuning. Case studies: LeNet-5, AlexNet, VGG-16, ResNets Self-driving car application. Generative Adversarial Networks (GAN)

UNIT-V

RNN and application to sequence modelling. Hyperparameter tuning. Some Case studies.

Text Books:

1. Deep Learning, Goodfellow et al, MIT Press
2. Machine Learning, Christopher Bishop, Springer

Online Resources:

1. "Machine Learning" by Prof.Andrew NG, Coursera (Stanford)
2. "Deep Learning" by Prof.Andrew NG, Coursera (Stanford)

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
EC3221	DIGITAL IMAGE PROCESSING (DIP)					PEC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Learn and understand the representation of Two Dimensional Linear shift-invariant Systems using Matrices
- To understand the acquisition of digital images.
- To learn and implement orthonormal and separable image transforms
- Learn point processing, neighbourhood processing and frequency domain methods for image enhancement
- Formulate and solve the optimization problems to achieve image restoration from degraded images

Course Outcomes

1. To Introduce the applications of Digital image processing in different research fields, and learn the Mathematical preliminaries required for analyzing two-dimensional systems.
2. Learn the acquisition process of Digital images.
3. Demonstrated understanding of Image transforms such as Discrete Fourier Transform, Cosine Transform, Hadamard Transform, and KLT.
4. Demonstrated understanding of image enhancement techniques
5. Understanding of formulation and solution of image restoration techniques

Unit-I: INTRODUCTION:

Mathematical Preliminaries and Two dimensional Systems Introduction to Image Processing and applications of image processing in different fields, Fundamentals of Linear algebra, and Probability, one-dimensional and two-dimensional Linear shift-invariant systems and their representation using matrices, one dimensional and Two Dimensional Convolution, Separable operations using matrices, Two-dimensional Discrete-time Fourier transform, Two dimensional Z transform and Properties.

Unit-II: Image sampling and Quantization

Sampling of One-dimensional signals, Sampling of Two-dimensional signals, Anti-aliasing filter, Quantization: Liyod Max quantizer, Uniform quantizer, Signal to quantization noise ratio.

Unit-III: Image Transforms

Unitary transforms and properties, 1D & 2D Discrete Fourier transform, 1D & 2D Discrete cosine transform, 1D & 2D Discrete sine transform, 1D & 2D Discrete Walsh transform, 1D & 2D Discrete Hadamard transform, 1D & 2D Discrete Haar transform, 1D & 2D Discrete KLT transform, Application of KLT for Face recognition.

Unit-IV: Image Enhancement

Point operations: contrast stretching, digital negative, Power law correction, dynamic range compression, intensity level slicing, Thresholding, Bit plane extraction; Histogram equalization and histogram specification; spatial operations: Linear and non-linear filtering in spatial domain using spatial masks, Unsharp masking; Transform Operations: Filtering in transform domain; Pseudo colouring

Unit – V: Image Restoration

Classification of restoration methods, Characteristic metrics for Image restoration, Linear and nonlinear degradation models, Inverse filtering, Pseudo inverse filtering, Wiener filtering: Least squares approach.

Textbooks:

1. A.K Jain, Fundamentals of Digital Image Processing, Prentice Hall.
2. R. C. Gonzalez, R.E. Woods, Digital Image Processing, Pearson.

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title					Course Type
HS3203	Soft Skills					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	0	0	2	40	60	1

Course Objectives

- To facilitate the students to speak effectively in formal and informal situations
- To indoctrinate the students with the indispensable writing skills to face the corporate world
- To develop structured writing in the documentation
- To enable the students to sharpen their communication skills towards writing a persuasive resume and effective job application letters
- To equip students with pre-presentation steps, to understand the structure of a good presentation, and equip various techniques for delivering a successful presentation
- To make students to understand the importance of teamwork and group presentations and group discussions

Course Outcomes

1. To communicate effectively in formal and informal situations
2. To understandthestructureandmechanicsofwritingresumes,reports,documentsande- mails
3. To present effectively in academic and professional contexts
4. To develop communication in writing for a variety of purposes
5. To identify areas of evaluation in Group Discussions conducted by organizations as part of the selection procedure.
6. To overcome stage fear and tackle questions

UNIT-I

Activities on Fundamentals of Inter-personal Communication

Introduction to soft skills, Behaviour types, passive, aggressive and assertive, starting a conversation - responding appropriately and relevantly – Body language: non-verbal & types (Proxemics, kinesics, and haptics)

UNIT-II

Activities on Reading Comprehension

Emotional Intelligence: definition, importance, EQ vs IQ, theoretical framework of Daniel Goleman: Definitions of Mayer and Salovey, Emotionally intelligent behavior vs emotionally destructive behavior, Reading-scanning-skimming-inferring meaning-criticalreading–surfing the Internet

UNIT-III

Activities on Writing Skills

Structure and presentation of different types of writing- Resume writing/ e-correspondence/ Technical report writing-planning for writing-improving one's writing.

UNIT-IV

Activities on Presentation Skills

Preparing a presentation, Grooming from campus to corporate Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations

UNIT-V

Activities on Group Discussion, Debate and Interview Skills

Dynamics of group discussion- intervention-summarizing-modulation of voice-body language-relevance-fluency and organization of ideas and rubricsfor evaluation- Concept and process-pre-interview planning-opening strategies-answering strategies-interviewthrough teleconference &video-conferencing -MockInterviews.

Text Books:

1. Soft Skills Training: A workbook to develop skills for employment – By Frederick H. Wentz
2. How to Talk to Anyone: 92 Little Tricks to Have Big success in Relationships – By Leil Lowndes

References:

1. Teamwork101: What Every Leader Needs to Know – By John C. Maxwell
2. Adaptability: How to Survive Change You Didn’t Ask For- By M.J. Ryan
3. Conflict Communication: A New Paradigm in Conscious Communication – By Rory Miller
4. Soft skills at work : Technology for career success. 2009. Beverly Amer.
5. Enhancing employability @soft skills . Shalini Verma. Pearson education. 2009.
6. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success. Gopalaswamy Ramesh.Pearson Education Ltd.2011.
7. Developing Soft Skills by Robert M. Sherfield, Montgomery and Moody Fourth Edn. 2009 PublisherPearson

THIRD YEAR (E4) – SEMESTER – II

Course Code	Course Title					Course Type
EC4406	WIRELESS SENSOR NETWORKS (WSN)					PEC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Understand the unique constraints and challenges of sensor networks and their applications.
- Learn about enabling technologies and protocols for wireless sensor networks, including routing and MAC protocols.
- Gain knowledge of dissemination and data gathering protocols, as well as data fusion and quality of service in sensor networks.
- Develop an understanding of the design principles and hardware components of single-node architectures in sensor networks.

Course Outcomes

1. Design wireless sensor networks for a given application
2. Understand emerging research areas in the field of sensor networks
3. Understand MAC protocols used for different communication standards used in WSN
4. Explore new protocols for WSN

Unit I:

Introduction to Sensor Networks, unique constraints and challenges, Advantages of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor Networks

Unit II:

Mobile Ad-hocNetworks (MANETs) and Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks. Issues and challenges in wireless sensor networks

Unit III:

Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee,

Dissemination protocol for large sensor networks. Data dissemination, data gathering, and data fusion; Quality of a sensor network; Real-time traffic support and security protocols.

Unit IV:

Design Principles for WSNs, Gateway Concepts Need for Gateway, WSN to Internet Communication, and the Internet to WSN Communication.

Unit V:

Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC.

Text Books:

1. WaltenegusDargie, Christian Poellabauer, “Fundamentals Of Wireless Sensor Networks Theory And Practice”, By John Wiley & Sons Publications,2011
2. SabrieSoloman, “Sensors Handbook" by McGraw Hill publication. 2009

References:

1. Feng Zhao, Leonidas Guibas, “Wireless Sensor Networks”, Elsevier Publications,2004
2. Kazem Sohrby, Daniel Minoli, “Wireless Sensor Networks”: Technology, Protocols and Applications, Wiley-Inter science
3. Philip Levis, And David Gay "TinyOS Programming” by Cambridge University Press 2009

THIRD YEAR (E4) – SEMESTER – II

Course Code	Course Title					Course Type
BM4210	**Professional Law and Ethics (PLE)**					HSMC
Prerequisite	Contact Hours per Week			Internal	External	Credits
	L	T	P			
	3	0	0	40	60	3

Course Objectives

- Understand business ethics and apply ethical decision-making frameworks
- Analyze contracts and evaluate legal protections for intellectual property
- Evaluate ethical practices in marketing, HRM, and finance
- Identify the essential elements of a valid contract and analyze different types of contracts
- Apply legal principles in practical situations to evaluate ethical practices and contractual agreements

Course Outcomes

7. Develop ethical decision-making skills and apply them to business scenarios
8. Analyze legal agreements and evaluate intellectual property protections
9. Evaluate ethical practices in functional areas of business and propose solutions for ethical dilemmas
10. Identify the essential elements of a valid contract and evaluate contractual agreements
11. Apply legal principles in practical situations to evaluate ethical practices and contractual agreements

UNIT - I: Business Ethics Definition

Importance of Ethics in Business - Distinction between Values and Ethics -Characteristics of Ethical Organization - Morality and Professional Ethics - Ethical Dilemmas- How to create an ethical working environment-Ethical Decision making in Business- Role of Corporate Governance in ensuring ethics in the workplace - Indian Ethical Traditions.

UNIT – II: ETHICS IN FUNCTIONAL AREAS OF BUSINESS- Ethics in Marketing: Ethical practices in product packaging and labelling - Pricing - Advertising -Direct marketing – Green marketing - Ethical vs. Unethical marketing behaviour. Ethics in HRM: Ethical implications of Privacy – Harassment – Discrimination – Whistleblowing. Ethics in Finance: Accountability – Window dressing and disclosure practices – Insider trading.

UNIT –III: Law of Contract:

Nature of Contract and Essential elements of a valid contract, Offer and Acceptance, Consideration, Capacity to contract and Free Consent, Legality of Object, Performance and discharge of Contracts, Remedies for breach of contract.

Unit-IVContracts-II:
Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: General Principles, Conditions & Warranties, Performance of Contract of Sale.

Unit- V: Law relating to Intellectual Property
Introduction–meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets;

Text Books:

1. Maheshwari & Maheswari - A Manual of Business Laws, Himalaya Publishing House.
2. D. Chandra Bose - Business Law PHI-Private Limited, New Delhi.

References:

1. A.C. Fernando - Business Ethics An Indian Perspective Pearson Education
2. Manuel G. Velasquez - Business Ethics Concepts and Cases Prentice-Hall of India Pvt.Ltd, 2008.
3. S.S. Gulshan - Business Laws Excel Books, New Delhi.