SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR - 440013

An Autonomous College affiliated to

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur,

Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI 2019 - 2020

B. E. (ELECTRONICS DESIGN TECHNOLOGY)

ABOUT THE DEPARTMENT

The department of Electronics Design Technology (EDT) was established in 1987 and offers undergraduate programme in Electronics Design Technology.

- The department is accredited twice in 2003 and 2007 by the National Board of Accreditation (NBA) of AICTE, New Delhi.
- The department has state of art laboratories to impart strong practical exposure to its students.
- Rs. 9 lakhs has been funded to PCB lab by AICTE under MODROB scheme.
- The CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, and earn extra credits through Major and Minors specialization
- The curriculum of the program emphasizes on electronic system design, with a homogenous mix of theory and practical subjects intending to give the students a better design approach.
- The Department vibrant student society GENESIS provides a platform towards overall development of the students through academic and extra-curricular activities.
- Industrial visits and Guest lectures by alumni, technocrats, and industry persons are organised regularly to provide the practical exposure and to enhance student's analytical, technical and extracurricular skills.
- Students are encouraged to undergo summer and winter trainings at various industries which helps them to identify the problem statements for their major projects.
- VIII semester students are encouraged to take up six months internship at different well-known research organisations / Industries / RCOEM-TBI.

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Department of Electronics Design Technology

VISION OF DEPARTMENT

To create Electronics design engineers who have technical excellence to work in industry in global scenario.

MISSION OF DEPARTMENT

To be eminent in training the students in identifying the need of electronic design industry and providing techno-economical solution by designing electronic system.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO'S)

- PEO1. Create graduates with basic knowledge of sciences, mathematics and electronics with an ability to excel in professional career and/or higher education.
- PEO2. Apply knowledge to provide economically feasible and socially acceptable solutions for multidisciplinary problems.
- PEO3.Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.

PROGRAMME OUTCOMES

1. **PO1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **PO3. Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **PO5. Modern tool usage: Create, select, and apply** appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES

- PSO1. Ability to understand all stages and the process involved in conceptualization, investigation, design and implementation of electronic systems.
- PSO2. Apply the contextual knowledge of electronics with multidisciplinary approach to develop an easily usable, reliable and techno-economical solution without affecting the environment and social structure.

Scheme of Teaching & Examination of Bachelor of Engineering (Electronics Design Technology)

III Semester B.E. (Electronics Design Technology)

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	MAT253	Engineering Mathematics	3	0	0	3	40	60	100	3Hrs
2	EET261	Network Theory	3	0	0	3	40	60	100	3Hrs
3	EDT251	Electronic Devices and Circuits	3	1	0	4	40	60	100	3Hrs
4	EDP251	Electronics Devices and Circuits Lab	0	0	2	1	25	25	50	
5	EDT252	Digital Circuit Design	3	0	0	3	40	60	100	3Hrs
6	EDP252	Digital Circuit Design Lab	0	0	2	1	25	25	50	
7	EDT253	Signals and Systems	3	1	0	4	40	60	100	3Hrs
8	IDT253	Biological Science	3	0	0	3	40	60	100	3Hrs
9	CHT251	Environmental Studies	2	0	0	0				
		Total academic Engagement	**20**	**2**	**4**	**22**				

Scheme of Teaching & Examination of Bachelor of Engineering (Electronics Design Technology)
IV Semester B.E. (Electronics Design Technology)

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	**T**	**P**		Continuous Evaluation	End Sem Exam	Total	
1	PHT251	Introduction to Electromagnetic theory	3	0	0	3	40	60	100	3Hrs
2	EDT254	Digital Signal Processing	3	0	0	3	40	60	100	3Hrs
3	EDP254	Digital Signal Processing Lab	0	0	2	1	25	25	50	
4	EDT255	Analog Circuits	3	1	0	4	40	60	100	3Hrs
5	EDP255	Analog Circuits Lab	0	0	2	1	25	25	50	
6	EDT256	Microprocessor and Microcontroller	3	0	0	3	40	60	100	3Hrs
7	EDP256	Microprocessor and Microcontroller Lab	0	0	2	1	25	25	50	
8	EDT257	PCB Technology	3	0	0	3	40	60	100	3Hrs
9	EDP257	PCB Technology lab	0	0	2	1	25	25	50	
10	OE	Open Elective-1	3	0	0	3	40	60	100	3Hrs
11	HUT252	Indian Traditional Knowledge	2	0	0	0				
		Total academic Engagement	**20**	**1**	**8**	**23**				

Scheme of Teaching & Examination of Bachelor of Engineering (Electronics Design Technology)
V Semester B.E. (Electronics Design Technology)

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration(Hrs)
			L	**T**	**P**		Continuous Evaluation	End Sem Exam	Total	
1	EET361	Control System	3	0	0	3	40	60	100	3Hrs
2	EDT351	Electromagnetic Waves	3	0	0	3	40	60	100	3Hrs
3	EDT352	CMOS Digital Circuit Design	3	1	0	4	40	60	100	3Hrs
4	EDP352	CMOS Digital Circuit Design Lab	0	0	2	1	25	25	50	
5	EDT353	Electronics Instrumentation	3	0	0	3	40	60	100	3Hrs
6	EDP354	Instrumentation and Control Lab	0	0	2	1	25	25	50	
7	EDT355	Program Elective – 1	3	0	0	3	40	60	100	3Hrs
8	EDP355	Program Elective – 1 Lab	0	0	2	1	25	25	50	
9	EDT 398	Open Elective-2	3	0	0	3	40	60	100	3Hrs
		Total academic Engagement	**18**	**1**	**6**	**22**				

Sr. No.	**Course Code**	**Program Elective – 1**
1	EDT355-1	Embedded Systems Design and RTOS
2	EDT355-2	Electronic System Design
3	EDT355-3	Shell Scripting and Python

Open Elective-2	
EDT 398-1	PCB Design

Scheme of Teaching & Examination of Bachelor of Engineering (Electronics Design Technology)

VI Semester B.E. (Electronics Design Technology)

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	**T**	**P**		Continuous Evaluation	End Sem Exam	Total	
1	HUT355	Principles of Economics and Management	3	0	0	3	40	60	100	3Hrs
2	EDT357	Object Oriented programming	2	0	0	2	40	60	100	3Hrs
3	EDP357	Object Oriented Programming lab	0	0	2	1	25	25	50	
4	EDT358	Electromagnetic Compatibility	2	0	0	2	40	60	100	3Hrs
5	EDT359	Analog and Digital Communication	3	1	0	4	40	60	100	3Hrs
6	EDP359	Analog and Digital Communication Lab	0	0	2	1	25	25	50	
7	EDT360	Program Elective – 2	3	0	0	3	40	60	100	3Hrs
8	EDP360	Program Elective – 2 Lab	0	0	2	1	25	25	50	3Hrs
9	EDP361	Electronics Product Design Lab	0	0	2	1	25	25	50	
10	EDP362	Comprehensive Viva	0	0	2	1	25	25	50	
11	EDT 399	Open Elective-3	3	0	0	3	40	60	100	3Hrs
		Total academic Engagement	**16**	**1**	**10**	**22**				

Sr. No.	**Course Code**	**Program Elective – 2**
1	EDT360-1	Computer Architecture and Organization
2	EDT360-2	Digital System Design
3	EDT360-3	Designing the IOT
4	EDT360-4	Machine Learning

Open Elective-3	
EDT 399-1	Microcontroller Based Design

Scheme of Teaching & Examination of Bachelor of Engineering (Electronics Design Technology)

VII Semester B.E. (Electronics Design Technology)

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration(Hrs)
			L	**T**	**P**		Continuous Evaluation	End Sem Exam	Total	
1	EDT451	Design of Electronic Equipments	3	0	0	3	40	60	100	3Hrs
2	EDT452	Reliability of Electronic Equipments	3	0	0	3	40	60	100	3Hrs
3	EDT453	Program Elective -3	3	0	0	3	40	60	100	3Hrs
4	EDT454	Program Elective -4	3	0	0	3	40	60	100	3Hrs
5	EDP455	Project Phase- 1	0	0	8	4	100		100	
6	EDP456	Industry Internship Evaluation (6-8 weeks)	0	0	2	0	50		50	
7	OE	Open Elective-4	3	0	0	3	40	60	100	3Hrs
		Total academic Engagement	**15**	**0**	**10**	**19**				

Sr. No.	Course Code	**Program Elective –3**	Course Code	**Program Elective –4**
1	EDT453-1	Wireless sensor network	EDT454-1	Testing and verification of Digital systems
2	EDT453-2	Wireless Communication	EDT454-2	Fibre Optics Communication
3	EDT453-3	Computer Networks	EDT454-3	Micro Electro Mechanical System

Scheme of Teaching & Examination of Bachelor of Engineering (Electronics Design Technology)

VIII Semester B.E. (Electronics Design Technology)

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	**T**	**P**		Continuous Evaluation	End Sem Exam	Total	
1	EDT457	Program Elective-5	3	0	0	3	40	60	100	3Hrs
2	EDT458	Program Elective -6	3	0	0	3	40	60	100	3Hrs
3	EDP459	Project Phase-II / Internship/ Incubation (Six months)	0	0	16	8	50	50	100	
		Total academic Engagement	**6**	**0**	**16**	**14**				

Sr. No	**Course Code**	**Program Elective – 5**	**Course Code**	**Program Elective -6**
1	EDT457-1	CMOS Subsystem Design	EDT458-1	Switching Theory and Finite Automata
2	EDT457-2	Microwave Theory and Technique	EDT458-2	SOC design
3	EDT457-3	Biomedical Electronics	EDT458-3	Power Electronics

Proposed Scheme for award of Minor specialization
Scheme of Teaching & Examination of Minor Specialization in Electronics Design Technology

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	EDTM 41	Fundamentals of Electronic Devices & Circuits	4	0	0	4	40	60	100	3Hrs
2	EDTM 51	Digital Circuits & Fundamentals of Microcontroller Based Design	4	0	0	4	40	60	100	3Hrs
3	EDTM 61	PCB Technology	4	0	0	4	40	60	100	3Hrs
4	EDTM 71	Design of electronic Equipment	4	0	0	4	40	60	100	3Hrs
5	EDPM 81	Mini Project	0	0	4	4	50	50	100	3Hrs
		TOTAL				**20**				

Note: If any of the above course is accessible to a student in his/her parent branch or Open electives then Credit transfer against above courses may be allowed if an appropriate MOOC course is completed by student after prior permission from HOD.

Proposed Scheme for award of Honors specialization

Scheme of Teaching & Examination of Honors specialization in Electronics Engineering

Sr. No.	Course Code	Course Title	Hours per week			Credits	Maximum Marks			ESE Duration (Hrs)
			L	T	P		Continuous Evaluation	End Sem Exam	Total	
1	ENTH41	Digital System Design	4	0	0	4	40	60	100	3Hrs
2	ENTH51	VLSI Technology	4	0	0	4	40	60	100	3Hrs
3	ENTH61	VLSI Signal Processing	4	0	0	4	40	60	100	3Hrs
4	ENTH71	Low Power VLSI	4	0	0	4	40	60	100	3Hrs
5	ENTH81	VLSI Design Automation	4	0	0	4	40	60	100	3Hrs
		TOTAL				**20**				

Note: Credit transfer against above courses may be allowed if an appropriate MOOC course is completed by student after prior permission from HOD

SYLLABUS OF SEMESTER III B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : MAT253 **COURSE NAME : ENGINEERING MATHEMATICS**

L: 03Hrs, T: 00 Hr., Per week **TOTAL CREDITS: 3**

Course Outcomes:

On successful completion of the course, students shall be able to

1. Make use of complex variable to evaluate contour integration.
2. Understand numerical method to solve algebraic equation and differential equation.
3. Prepare students to understand probability theory and use it for analysis of data.
4. Make use of partial differential equation to solve problem related to transmission lines

Syllabus for Engineering Mathematics

Unit I : Functions of a Complex Variable: Function of a complex variable, Analytic functions, Cauchy-Riemann conditions, Conjugate functions, singularities, Cauchy's integral theorem and integral formula, Taylor's and Laurent's theorem, Residue theorem, contour integration. (10 Lect)

Unit II : Partial Differential equations : Partial differential equation of first order first degree i.e. Lagrange's form. Linear homogeneous PDE of nth order with constant coefficient, method of separation of variables, Applications of partial differential equations. (10 Lect)

Unit III : Numerical Methods: Error analysis, solution of algebraic and transcendental equations. False position method, Newton Raphson method and their convergence. Solution of system of linear equations, Gauss elimination method, Gauss Seidal method, Crout's method. Numerical solution of ordinary differential equation by Taylor's series method, Euler modified method, RungeKutta method, Milne's Predictor Corrector method. (11 Lect)

Unit IV : Random variables, Discrete and continuous distributions, Mathematical expectations: the variance and standard deviation, moment generating function. (9 Lect)

Text Books / Reference Books:

1. Higher Engineering Mathematics :B. S. Grewal., 43rd ed: Khanna Publishers, Delhi (India).
2. Theory and Problems of probability and statistics : 2nd ed :J. R. Spiegal, Schaum series.
3. Introductory method of numerical analysis, 4 edition :S. S. Sastry.

SYLLABUS OF SEMESTER III B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EET 261 **COURSE NAME : NETWORK THEORY**

L: 03Hrs, T: 00 Hr., Per week **TOTAL CREDITS: 3**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Apply network theorems for the analysis of electrical circuits.
3. Apply Laplace Transform for steady state and transient analysis.
4. Analyze different network function.
5. Analyze two port network circuit with different interconnections.

Syllabus:

Module 1:--Node and Mesh Analysis (7 Hours)

Node and mesh analysis, matrix approach of network containing voltage, current sources and reactances, source transformation and duality. Mutual coupled circuits, Dot Convention in coupled circuits**.**

Module 2:--Network theorems: **(6 Hours)**

Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.

Module 3:- Behaviors of AC circuit and Introduction to Filters (4 hours)

Ac circuit analysis with dependent current and voltage sources. Series and parallel resonant circuits. Introduction to band pass, low pass, high pass and band reject filters.

Module 4: Electrical Circuit Analysis Using Laplace Transforms: **(8 Hours)**

Review of Laplace Transform, Partial fractions, singularity functions, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, evaluation of initial conditions. Transformed network with initial conditions, waveform synthesis, and analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms.

Module 5:-Transient behavior of Network and Network Functions (5 Hours)

Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem

Module 6:- Two port network (5 hours)

Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

Text Book:

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.

2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.

3. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, **2013.**

Reference Books :

1. Sudhakar, A., Shyammohan, S. P.; “Circuits and Network”; Tata McGraw-Hill New Delhi, 1994

2. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.

3. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.

SYLLABUS OF SEMESTER III B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE: EDT251 COURSE NAME: ELECTRONIC DEVICES AND CIRCUITS

L: 03Hrs, T: 01, P: 00 Hrs per week TOTAL CREDITS: 4

Course Outcomes:

Upon the completion of this course students will be able to:

1. Understand the operation and analyze the characteristics of semiconductor diodes, MOSFET, and BJT.
2. Examine and design electronic circuits containing non-linear elements such as diodes, MOSFET, &BJT using the concepts of biasing, load lines, operating point and incremental analysis.
3. Analyze single and multistage amplifiers at low, mid and high frequencies using low frequency and high frequency models of MOSFET/BJT.
4. Apply feedback techniques in amplifier and examine its effect on parameters of amplifiers (ex. Gain, bandwidth, i/p and o/p impedance, etc) and the stability of amplifier.
5. Investigate various types of power amplifiers and evaluate their performance parameters.

Syllabus:

Module I: (6 Hrs)

Diode Models and Circuits: V-I Characteristics of P-N Junction Diode, load line concepts, DC Analysis and Models of P-N Junction Diode, types of special diodes, Applications of PN junction diode ─ Rectifier, Clipper, Clamper; Zener Diode circuits ─ shunt regulator, DC power supply.

Module II: (7Hrs)

Bipolar Junction Transistors: Device structure and Physical Operation, Current Components in BJT, Input-Output and Transfer characteristics in CB, CC and CE configuration, Load line concept, Biasing techniques, Bias Stability, The Ebers-Moll Model and small signal model of BJT, Applications of BJT.

Module III :(8Hrs)

Field-effect Transistors: FET, MOSFET – Classification, Construction, Physical Operation, Volt-Ampere Characteristics, DC operating point, biasing the MOSFET; small signal model of the MOSFET, small signal analysis, Applications of MOSFET: Switch, Amplifier, Digital Logic Inverter.

Module IV: (10Hrs)

Basic BJT & MOSFET Amplifiers: Classification of amplifiers, distortions in amplifiers, basic configurations of MOSFET amplifier, Single-stage and Multi-stage transistor amplifiers, low frequency and high frequency response, effect of emitter (or source) bypass capacitor on the frequency response of amplifier, High frequency model of the MOSFET, Miller's theorem.

Module V: (7Hrs)

Feedback amplifier & Stability: General Feedback amplifier Structure, Properties of Negative Feedback, Basic Feedback Topologies, The Stability of Amplifier, Transfer Function of the feedback Amplifier, Poles and Zeros of Amplifier Transfer Function, Effect of Feedback on the amplifier poles, phase margin, unity gain bandwidth, compensation of the cascaded amplifier.

Module VI: (7 Hrs)

Power Amplifiers: Audio power amplifier, class-A/class-B/class-C; push-pull amplifier, class-AB power amplifier, Harmonic Distortion due to Large Signal operation

Textbook:

1. Microelectronics Circuits: Theory and Applications: Adel S. Sedra, Kenneth C. Smith, Arun N. Chandorkar, Seventh Edition, Oxford University Press, 2017.

Reference Books:

1. Electronic Circuits: Analysis and Design: Donald Neamen, Third Edition, McGraw-Hill Publication, 2006.
2. Solid State Electronic Devices: G. Streetman, and S. K. Banerjee, Seventh edition, Pearson, 2014.
3. Semiconductor Physics and Devices: Basic Principles: Donald Neamen, Fourth edition, McGraw-Hill, 2011.
4. Millman's Integrated Electronics: Jacob Millman, Christos Halkias, Chetan Parikh, Second edition, McGraw Hill Education, 2017.
5. Microelectronics: Behzad Razavi, Second edition, Wiley India Pvt. Ltd., 2018.
6. Electronic Devices and Circuits: David A. Bell, Fifth Edition, Oxford 2008.
7. Microelectronic Circuits Analysis and Design: Muhammad H. Rashid, Second edition, Cengage Learning India, 2012.

SYLLABUS OF SEMESTER III B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EDT252 **COURSE NAME : DIGITAL CIRCUIT DESIGN**

L: 03Hrs, T: 0 Hr., per week **TOTAL CREDITS: 3**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand number systems conversions and apply the principles of Boolean algebra to manipulate, minimize and design logic circuits using logic gates.
2. Demonstrate knowledge of various combinational logic circuits like code converters, multiplexers, adders and use them in the design and analysis of complex hierarchical combinational blocks like multipliers, fast adders etc.
3. Demonstrate knowledge of sequential logic circuits elements like latches, flip-flops and use them in the design and analysis of counters, registers, simple finite state machine and similar circuits.
4. Understand and describe the architecture of logic families, memory elements and combinational digital circuits implementation with programmable logic devices.
5. Design, debug and verify simple digital circuits and systems with the aid of HDL (Verilog) and appropriate EDA tool.

Syllabus

Module I: (7 Hrs)

Logic Simplification: Binary Arithmetic, Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Logic Gates, combinational Logic Optimization Techniques.

Module II: (6 Hrs)

Combinational logic Design: Comparators, Multiplexers, Demultiplexer, Encoder, Decoder, Arithmetic Circuit Design, Barrel Shifter, ALU.

Module III: (6 Hrs)

Sequential Logic Design: Latches, Flip flop – S-R, JK, D, T and Master-Slave JK FF, counters, Shift registers, Finite state machines & their implementation.

Module IV: (5 Hrs)

Logic Families and Programmable Devices: Introduction to logic families, comparison and interfacing, Concept of PLDs like ROM, PAL, PLA, CPLDs, FPGA etc. Logic implementation using Programmable devices, Memories & their architecture.

Module V: (5 Hrs)

Overview of Digital Design with HDL: Different methodologies and its implementation process. Introduction to Verilog HDL for Digital Circuit implementation, language constructs.

Module VI: (6 Hrs)

Different Modeling Styles: Structural, sequential behavioral constructs, test bench, synthesis of HDL.

TEXT BOOKS:

1. Fundamentals of Digital Logic with Verilog: Stephen Brown and ZvonkoVranesic, McGraw Hill, 2nd Edition.

REFERENCE BOOKS:

1) Fundamentals of digital circuits: A. Anand Kumar, Prentice-Hall of India, 4th Edition.
2) Modern digital Electronics: R.P. Jain, Tata McGraw Hill, 4th Edition.
3) Digital Electronic Principles: Malvino , PHI, 3rd Edition.
4) Verilog HDL: A Guide to Digital Design and Synthesis: Samir Palnitkar, Prentice Hall PTR, 2nd Edition.

SYLLABUS OF SEMESTER III B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EDT253 **COURSE NAME : SIGNALS AND SYSTEMS**

L: 03Hrs, T: 01 Hr., Per week **TOTAL CREDITS: 4**

Course Pre-requisites:

Engineering Mathematics

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to:

1. Skillfully use the concepts of mathematics for the analysis of signals and systems in time and frequency domain.
2. Appreciate the importance of Fourier series and Fourier transform techniques
3. Analyze and characterize Continuous Time signals and systems through Laplace Transform
4. Recognize the need for of discretizing a signal and importance of Nyquist Criterion
5. Build necessary foundation for Digital Signal Processing

Syllabus

Module I:(8 Hrs)

Introduction to Signals and Systems: Elementary continuous & discrete time signal, basic operations on signals, classification of signals, introduction to system and system classification

Module II: (8 Hrs)

Time domain analysis of Continuous Time(CT) system:classical method, convolution integral and their properties, causality, correlation, stability, step response, impulse response of interconnected systems

Module III: (8 Hrs)

Fourier series analysis of CT periodic signals: representation, properties, Fourier spectrum, Gibb's phenomenon, introduction to Discrete Time Fourier Series (DTFS)

Module IV:(7 Hrs)

Continuous Time Fourier transform (CTFT): properties, FT of periodic signals, modulation, system analysis with FT

Module V:(8 Hrs)

Overview of Laplace Transform: Need of Laplace Transform, Unilateral and bilateral LaplaceTransform, properties, concept of Region of Convergence (ROC), inverse of Laplace Transform, the S-plane and BIBO stability and Causality,Transfer function,Solution of differential equations with initial conditions, Analysis of LTI System Using L.T. and Applications, S relation between continuous time Fourier Transform and Laplace Transform

Module VI: (6 Hrs)

Sampling: Nyquist Criteria of sampling, sampling theorem, anti-aliasing, signal reconstruction, analog to digital conversion, signal transmission though linear system, distortion less transmission through a system, linear phase system, ideal filter, signal and system bandwidth, relationship between bandwidth and rise time

TEXT BOOKS:

1. Signals and Systems; A.V. Oppenhemn, A.S. Willsky and I.T. Young; Prentice Hall, 1st edition, 1983

REFERENCE BOOKS:

1) Signals and Systems; A. NagoorKani, Mc Graw Hill Education, 2015
2) Signals and Systems; Simon Haykin, Barry van Veen; John Wiley and Sons, 2nd edition, 2002
3) Linear Systems & Signals: B.P.Lathi, Oxford Press , Second Edition 2009

SYLLABUS OF SEMESTER III B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : IDT 253 **COURSE NAME : BIOLOGICAL SCIENCE**

L: 03 Hrs. T: 00 Hr, Per week **TOTAL CREDITS: 3**

Course Outcomes:

Upon the completion of this course students will be able to

1. Understand the basics of biology regarding the life structures and process.
2. Understand the principles of energy transaction in living systems.
3. Understand the process of generation of bioelectric signals, Bioelectric Devices and recent advances in Biosciences.

Syllabus:

MODULE I: (6 Hrs)

Introduction: Engineering perspective of Biological Sciences, Fundamental differences between science and Engineering- case studies; Hierarchy and classification of life forms, Levels of organization of life- cell, tissues, organs, system and organism, Anatomy and physiology.

MODULE II: (6 Hrs)

Biomolecules and Enzymes: Biomolecules as basic building block of all forms of life, structure and function of carbohydrates ,proteins and Amino acids, Lipids, Nucleic acids ,Vitamins and Minerals, Enzymology- Introduction ,classification and mechanism of action

MODULE III: (6 Hrs)

Metabolism /Bioenergetics: Fundamental principles of energy transactions (Thermodynamics) as applied to biology, Entropy changes in biological systems, free energy, equilibrium, process of synthesis and breakdown of glucose.

MODULE IV: (6 Hrs)

Genetics: Introduction to Genetics, genetic codes, Expression and Transmission of genetic Information, concept of DNA cloning , single gene disorders in humans**.**

MODULE V: (6 Hrs)

Bioelectric signals and devices : Resting and action potential, propagation of bioelectric signals, various bioelectric signals- ECG,EEG,EMG; Electrode electrolyte interface, Biosensors and Diagnostic devices.

MODULE VI: (5 Hrs)

Advance Topics in Biosciences: Current trends in the field of cell and Molecular biology, Biomemetics, Bioinformatics, Nanobiotechnology**.**

TEXT BOOKS:

1. Biology: A Global Approach: Campbell,N.A.;Reece,J.B;Urry,Lisa; Cain,M,L; Wasserman,S.A.; Minorsky,P.V.;Jackson,R.B.Pearson Education Ltd.

REFERENCE BOOKS:

1. Molecular Cell Biology. W.H.Freeman.: Lodish H,Berk A,Zipursky SL, et al. (2000)
2. Lehninger Principles of Biochemistry.: Lehninger,A.L.,Nelson ,D.L., & Cox,M.M(2000) . Newyork; Worth Publishers
3. Genes VII: Lewin B.(2000). Oxford University Press.
4. Medical Instrumentation Application and Design :John G. Webster, ,4th edition, Wiley India,2015

SYLLABUS OF SEMESTER III B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : CHT251 **COURSE NAME : ENVIRONMENTAL STUDIES**

L: 02 Hrs. T: 00 Hr, Per week **TOTAL CREDITS: 0**

Course Outcomes

1. Students will get sufficient knowledge regarding different types of environmental pollutions, their causes and detrimental effects on environment. This will highlights the extent of pollution in the surrounding we live and its major causes.
2. Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observations and self learning
3. Student becomes conversant with recent waste management techniques such as E-waste recycling and management.
4. Students will gain knowledge about the modes for sustainable development, importance of green energy and processes leading to sustainability such as green chemistry.
5. At the end of the course, it is expected that student will able to identify and analyze environmental problems as well as risk associated with these problems and greener efforts to be taken to protect the environment from getting polluted. This will enable human being to live in more sustainable manner.

Syllabus

Principle of contaminant behavior and recent trends in environmental pollution Control

I- Air pollution and its control techniques: (4 lectures)

Contaminant behavior in the environment, Air pollution due to SOx, NOx, photochemical smog, Indoor air pollution

Natural pathways for degradation: Carbon cycle, Sulphur cycle, Nitrogen cycle, Oxygen cycle.

Factors responsible for altering the composition of atmosphere (deforestation, burning of fossil fuels, industrial and vehicular emissions, CFCs).

Techniques to control Air pollution: Ambient air quality and continuous air quality monitoring, Control measures at source, Kyoto Protocol, Carbon Credits.

II- Noise pollution and its control techniques: (2 lectures)

Introduction to noise pollution and its causes

Noise pollution control: recent advances in noise pollution control and benefits.

III- Soil pollution and its control techniques: (5 lectures)

Soil pollution: Soil around us, Soil water characteristics, soil and pollution.

Solid waste management: composting, vermiculture, landfills, hazardous waste treatment, Bioremediation technologies, conventional techniques (land farming, constructed wetlands), and phytoremediation.

Degradation of xenobiotics in environment: Petroleum hydrocarbons, pesticides, heavy metals

IV-Water pollution and its control techniques: (6 lectures)

Major sources of water pollution: Eutrophication, acid mine drains, pesticides and fertilizers, dying and tanning, marine pollution, microplastics

Techniques to control water pollution: Conventional waste water treatment-(types of sewage, sewerage system, alternative systems, primary secondary and tertiary process including aerobic and anaerobic techniques, safe disposal)

Case studies: (2 lectures)

Treatment schemes for waste water from Dairy, Textile, power plant, pharmaceutical industries, and agro based industries such as rice mills

V- E-waste (2 lectures)

Introduction, types of e-wastes, environmental impact, e-waste recycling, e-waste management rules.

VI- Environmental Sustainability: Role of Green technology (5 lectures)

Concept of green technologies, categories, goals and significance, sustainability.

Green energy, green chemistry, challenges to green technology, advantage and disadvantages of green processes, Eco mark certification- its importance and implementation

Different government initiatives (2 lectures)

Books suggested:

1. Benny Joseph, Environmental Studies (Second Edition), Mc Graw Hill Education (India) Private Limited
2. B. K. Sharma, Environmental Chemistry, Goel Publishing House, Meerut
3. P Aarne Vesilind J. Jeffrey Peirce Ruth F. Weiner, Environmental Pollution and Control, 3rd Edition, Imprint: Butterworth-Heinemann, Published Date: 19th September 1990,
4. D. D. Mishra, S. S. Dara, A Textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd. Sultan Chand & Company
5. Microbial Degradation of Xenobiotics, Editors: Singh, Shree Nath, Springer-Verlag Berlin Heidelberg
6. Anastas, P.T. & Warner, J.C. 1998, Green Chemistry: Theory & practice. Oxford University Press.
    1. Thangavel, P. & Sridevi, G. 2015. Environmental Sustainability: Role of Green technologies, Springer publications

SYLLABUS OF SEMESTER IV B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : PHT251 COURSE CODE : INTRODUCTION TO ELECTROMAGNETIC THEORY

L: 03Hrs, T: 00 Hr., TOTAL CREDITS: 3

Course Outcomes:

Upon the completion of this course students will be able to:

1. Define and recognize different coordinate systems to describe the spatial variations of the physical quantities dealt in electromagnetic field theory.
2. Explain fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields in different media.
3. Understand the working principle of electromagnetic energy conversion and electromagnetic energy storage devices.
4. Deduce and justify the concepts of electromagnetic waves, means of transporting energy or information thus creating a base for Microwave Engineering.

Syllabus:

MODULE I: (3 Hrs)

Introductory Mathematical Preliminaries: Introduction to Cartesian,Cylindrical and Spherical coordinate systems, Divergence, Divergence Theorem.

MODULE II: (7 Hrs)

Time Invariant Electric Fields: Electric field intensity, flux density, Gauss's law& its Application, Electric potential and potential gradient, Materials in the Electric Field, Interface Conditions, Capacitance, Energy in the Electrostatic Field,Boundary Value Problems: Analytic Methods of Solution, Laplace & Poisson's equation.

MODULE III: (7 Hrs)

Time Invariant Magnetic Fields: Current density and continuity equation, Biot-Savart's law, Ampere's circuital law and applications,Magnetic flux and Flux density, Boundary conditions, Classification of Magnetic Materials

MODULE IV: (4 Hrs)

Introduction To Time-Varying Fields: Faraday's law in integral and differential form, Ohm's law, Lenz's law, electromotive force (emf) and work, inductance (mutual and self), displacement current.

MODULE V: (7 Hrs)

Maxwell's Equations: Maxwell's equations for steady fields, Maxwell's equations for time varying fields. Interface Conditions for the Electromagnetic Field,Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric and perfect conductor, skin effect, Scalar and Vector magnetic potentials.

MODULE VI: (7 Hrs)

Electromagnetic Waves: Poynting vector, Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle, polarization.

TEXT BOOKS:

1. Field and Wave Electromagnetics: David Cheng, Pearson India, 2nd Edition, 2014

REFERENCE BOOKS:

1. Fundamentals of Applied Electromagnetics: Fawwaz T. Ulaby, Umberto Ravaioli, Pearson India, 6thedition, 2014.
2. Engineering Electromagnetics: Nathan Ida, Springer Science 2nd Edition, 2008.
3. Principles of Electromagnetics: Matthew N. O. Sadiku, 6th edition.
4. Engineering Electromagnetics: William Hayt, John. R. Buck, Mc-Graw Hill Education, India, 8th Edition.
5. Electromagnetic Waves and Radiating Systems: Edward C. Jordan, Keith G. Balmain, Pearson India, 2nd Edition 2015.
6. Electromagnetics with Applications: John Kraus, Mc-Graw Hill Education, India, 5th Edition, 1999.

SYLLABUS OF SEMESTER IV B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE: EDT254 **COURSE NAME: DIGITAL SIGNAL PROCESSING**

L: 03Hrs, T: 00 Hrs, P: 00 Hrs. per week **TOTAL CREDITS: 3**

Course Outcome:

Upon the completion of this course, students will demonstrate the ability to:

1. Represent discrete time signals in different forms and analyze the LTI system in frequency domain.
2. Process the signal in z domain for various discrete time systems
3. Understand the filter design techniques for discrete time, IIR and FIR filter and will be able to determine parameters affecting its response and draw the structures of filters.
4. Analyze the various finite world length effects while rounding and truncating the signal, understand DSP hardware and DSP applications.

Syllabus:

Module I: (4 Hrs)

Discrete Time Fourier Transform (DTFT): Analysis of LTI system using DTFT, block diagram and signal flow graph representation of linear constant coefficient difference equations

Module II: (7 Hrs)

Z-transform: Z-transform and its properties, analysis of LTI discrete time system using Z transform, Relation between Laplace and Z transform, Inverse Z-transform, Unilateral Z- transform.

Module III: (7 Hrs)

Discrete Fourier Transform (DFT): Frequency Domain sampling, DFT and its properties, filtering of long data sequences using overlap-save method and overlap-add method, Radix-2 Fast Fourier Transform (FFT) algorithms

Module IV: (7 Hrs)

Design of FIR filter: Digital filter concepts, FIR filters Design techniques: Fourier series, Windows (Rectangular, Bartlett, Hanning, Hamming, Blackman, Kaiser) and Optimal frequency sampling, structures for FIR systems

Module V: (5 Hrs)

Design of IIR filter: Impulse invariance transformation, Bilinear Transformation, Design of Butterworth and Chebyshev filters, structures for IIR systems.

Module VI: (5 Hrs)

DSP hardware and Finite word length effects: Quantization by truncation and Rounding, Quantization of Input data and filter coefficients, Digital Signal Processing applications, introduction to DSP processors.

Text Book:

1. Digital Signal Processing: Principles, Algorithms & Applications, John G. Proakis & Dimitris G. Manolakis, PHI, 4th Edition

Reference Books:

1. Digital Signal Processing: A Computer based Approach, Sanjit K. Mitra, 4th Edition Mc-Graw Hill
2. Discrete Time Signal Processing, Alan V. Oppenheim & Ronald W. Schafer, 3rdEdition, Pearson
3. Digital Signal Processing, Thomas J. Cavicchi, Wiley Publication, Student Edition
4. Digital Signal Processing, A NagoorKani, 2nd Edition Mc-Graw Hill

SYLLABUS OF SEMESTER IV B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EDT255 **COURSE NAME : ANALOG CIRCUITS**

L: 03Hrs, T: 01 Hr., Per week **TOTAL CREDITS: 4**

Course Outcomes:

Upon the completion of this course, students will demonstrate the ability to:

1. Describe operating principle and analyze differential amplifier.
2. Calculate performance parameters of operational amplifier and design basic linear and nonlinear Op-amp circuits.
3. Design and analyze Op-amp based electronic circuits, Oscillators, Filters, waveform generators and comparators.
4. Use timer IC 555, ADC/DAC and PLL IC 565 for designing electronic circuits for desired applications.

Syllabus

Module I: (8Hrs)

Differential amplifier: Basic differential amplifier and its operation using MOS transistor, dc characteristics, operation with common mode and differential mode input voltage, common mode gain , differential mode gain and CMRR, Constant current source and current mirror circuits, output stages, design of differential amplifier for given specifications.

Module II: (7 Hrs)

Op-amp fundamentals: Characteristics of operational amplifier, open loop Op-amp, basic inverting and non-inverting Op-amp amplifiers with negative feedback, Op-amp parameters & their analysis.

Module III: (8 Hrs)

Op-amp linear applications: Voltage follower, summing amplifiers, integrators and differentiators, log,antilog circuits, difference amplifiers & instrumentation amplifiers, Current to voltage and voltage to current converters.

Module IV: (8 Hrs)

Oscillators and Active filters design: Precision rectifiers, oscillators: basic concept, transistorized sinusoidal oscillators, Op-amp based sinusoidal oscillators, design of Active filters.

Module V:(7 Hrs)

Op-amp Non-linear applications: Clipper, Clamper, Comparators, Schmitt trigger circuits, Comparator IC 339,Triangular wave generator, multivibrator circuits using op-amps, Sample/Hold circuits, Digital to analog converters, Analog to digital converters.

Module VI: (7 Hrs)

Timer and PLL ICs: Timer IC 555: Internal block schematic, multivibrator configurations, PLL & its applications. Basic concept and configurations of Switched capacitor circuits.

TEXT BOOKS:

1. Microelectronics Circuits: Theory and applications: A.S.Sedra, Kenneth C.Smith, Arun N.Chandorkar, Seventh Edition, Oxford university Press,2017.

REFERENCE BOOKS:

1. Linear Integrated Circuits: D. Roy Choudhary, Shail Jain, 4th Edition, New Age International.
2. Design with Operational Amplifiers and Analog Integrated Circuits, 3rd Edition: Sergio Franco, TMH,
3. Operational Amplifiers: G. B. Clayton,5th Edition, International Edition
4. Operational Amplifiers and Linear Integrated Circuits, 4th Edition: Coughlin Driscoll,PHI
5. Introduction to Operational Amplifier theory and applications: J.V.Wait, L.P.Huelsmanand G A Korn,McGraw Hill,1992
6. Electronic Circuits: Analysis and design: Donald Neaman,.third Edition, McGraw Hill,2006

SYLLABUS OF SEMESTER IV B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EDT256 **COURSE NAME : MICROPROCESSOR AND MICROCONTROLLER**

L: 03Hrs, T: 00 Hr., Per week **TOTAL CREDITS: 3**

Course Outcomes:

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

1. Understand the architecture of microprocessor & microcontroller.
2. Develop, understand and analyze the programs, select appropriate machine and cross assembler utility of a microprocessor and microcontroller.
3. Acquire the knowledge, techniques and skill to interface external peripheral devices with microprocessor or microcontroller.
4. Design microcontroller-based system to solve the real world problem.

Syllabus

Module I: (4Hrs)

8085 architecture and Instructions: Introduction to RISC and CISC processors, Harvard and Von Neumann architecture, Introduction to Intel's 8085, architecture, pin diagram, bus concepts, addressing modes. Instruction set, stack and subroutines- simple & nested, stack manipulation, simple programs.

Module II: (5Hrs)

8085 Timing diagram and Interrupts: Timing diagram sof 8085, Memory mapping, interrupts-concept and structure, interrupt service routines, interrupt programming of 8085.Architecture and interface of 8255 with 8085.

Module III: (6Hrs)

Introduction to Intel's x86: Introduction to Intel's x86 processor architecture, segmentation, pipelining, addressing modes, memory architectures and management.

Module IV: (7Hrs)

Introduction of Microcontroller: x51 Family Microcontrollers, their Architecture & programming.

Module V:(7Hrs)

Interfacing with x51: Interfacing of Switches & Relays, Stepper motor, LED, SSD, LCD, Analog-to-Digital Converter (ADC), DC motor. Power management in x51controller: Sleep mode, idle mode, Run Mode.

Module VI: (6Hrs)

Commutation Protocols: I/O Port Expansion using RS232, RS422, RS485, Serial Peripheral Interface (SPI), Synchronous Serial Port (SSP) Module, I2C Communication.

TEXT BOOKS:

1. The 8051 Microcontroller and Embedded Systems Using Assembly and C; Muhammad Ali Mazidi, 2nd Edition, Pearson

2. Microprocessor: Architecture, Programming & applications with 8085; Ramesh S. Gaonkar; Penramth International, 5 Edition.

REFERENCE BOOKS:

1. 8085 Microprocessor: Programming and Interfacing; N. K. Srinath; PHI, 1 Edition.
2. Microcomputer systems: the 8086/8088 family: Architecture, Programming, and Design; Yu-chengnd Liu, Glenn A. Gibson; Prentice-Hall, 2 Edition.
3. Advanced Microprocessors and Peripherals; A. K. Ray & K. M. Bhurchandi; McGraw Hill, 3rdEdition.

SYLLABUS OF SEMESTER IV B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EDT257 **COURSE NAME : PCB TECHNOLOGY**

L: 03Hrs, T: 00 Hr., Per week **TOTAL CREDITS: 3**

Course Outcomes

Upon the completion of this course, students will demonstrate the ability to:

1. Design electrical and electronic circuits and conduct experiments.
2. Use advance techniques, skills and modern tools for fabrication of PCBs.
3. Use advance PCB technologies, such as Multilayer, SMT and HDI.
4. Understand concepts of Packaging.

Syllabus

Module I: (5 Hrs)

Introduction to Printed circuit board: Basics of printed circuit board designing: Layout planning, general rules and parameters, ground conductor considerations, thermal issues, check and inspection of artwork.

Module II: (5hrs)

Design rules for PCB: Design rules for Digital circuit PCBs, Analog circuit PCBs, high frequency and fast pulse applications, Power electronic applications, Microwave applications.

Module III: (6 hrs.)

Introduction printed circuit board production techniques: Photo printing, film-master production, film emulsion, stability, reprographic camera, basic process for double sided PCBs photo resists, wet film, dry film, Screen printing process.

Module IV: (6 hrs)

Printed circuit board fabrication process: Plating, immersion plating, Electro less-plating, Electro-plating, tinning, relative performance and quality control, Etching machines. Etchants and its comparative study. Solders alloys, fluxes, soldering techniques, Mechanical operations.

Module V: (7hrs)

PCB Technology Trends: Multilayer PCBs. Multiwire PCB, Flexible PCBs, Surface mount PCBs, Laminating process, Introduction to High-Density Interconnection (HDI) Technology.

Module VI: (7 hrs)

PCB design for EMI/EMC: Component placement, Subsystem/PCB Placement in an enclosure, Filtering circuit placement, decoupling and bypassing, Electronic discharge protection, Introduction to Integrated Circuit Packaging and footprints, NEMA and IPC standards.

Text Books:

1. Printed circuit board design ,fabrication assembly and testing By R. S. Khandpur,Tata Mc Graw Hill 2006

Reference Books:

1. Printed circuit Board Design and technology, Walter C. Bosshart
2. Introduction to System-on-Package, Rao R Tummala & Madhavan Swaminathan, , McGraw Hill, 2008.
3. EMC and Printed circuit board ,Design theory and layout, Mark I Montrose IEEE compatibility society
4. Flexible Printed circuit board Design and manufacturing ,By Robert torzwell
5. Printed Circuits Handbook, Sixth Edition,by Clyde F. Coombs, Jr.
6. Printed Circuit Board Designer's Reference: Basics,Christopher T. Robertson Prentice Hall Professional, 2004

SYLLABUS OF SEMESTER IV B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : HUT252	**COURSE NAME : INDIAN TRADITIONAL KNOWLEDGE**
L: 02 Hrs, T: 00 Hr., Per week	**TOTAL CREDITS: 0**

Course outcome:

Students will have increased ability to understand the importance and application of:

CO1: Indian Knowledge system and its scientific approach

CO2: Indian philosophical tradition

CO3: Indian artistic tradition

CO4: Traditional knowledge and protection of nature

CO5: The legality and its importance for the protection of Indian traditional knowledge

Syllabus

1. **Basic Structure of Indian Traditional Knowledge:** *Vedas, Upavedas, Vedang, Upadang,* scientific approach
2. **Ecology and Indian Traditional Knowledge:** Meaning, role, case studies
3. **Intellectual Property Rights and Indian traditional Knowledge:** Meaning, role in protection of Indian traditional knowledge, cases studies
4. **Indian Philosophical traditions:** *Nyay, Sankaya, Yog, Mimansa,* Jainism, Buddhism, Sikhism, and other approaches
5. **Indian Artistic Traditions:** *Chitrakala, Murtikala, Vastukala, Sangeet, Sthpatya, NrityaevamSahitya,* case studies

Reference material

1. RR Gaur, Rajeev Sangal, GP Bagaria, Human Values and Professional Ethics (Excel Books, New Delhi, 2010)
2. V. Sivaramakrishanan (ed.), Cultural Heritage of India – Course material, BharatiyaVidyaBhavan, Mumbai, 5th Edition, 2014
3. Swami Jitatmanand, Modern Physics and Vedant, BharatiyaVidyaBhavan
4. Swami Jitatmanand, Holistic Science and Vedant, BharatiyaVidyaBhavan
5. S.C. Chatterjee and D.M. Datta, An introduction to Indian Philosophy, University of Calcutta, 1984
6. Pramod Chandra, Indian Arts, Howard University Press, 1984
7. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987

SYLLABUS OF SEMESTER V B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EET 361 **COURSE NAME : CONTROL SYSTEM**

L: 03HRS, T: 00 HR., PER WEEK **TOTAL CREDITS: 3**

Course Outcomes:

Upon the completion of this course, the students:

1. Will be able to determine the transfer function of the system by different methods.
2. Will be able to understand various time response specifications for improving the system response.
3. Will be able to determine the stability of the systems and method of design by root locus.
4. Will be able to understand the concept of frequency domain analysis of a system.
5. Will be able to understand the concept of modern control system theory for design and analysis of a system

Syllabus

Module I: (6 Hrs)

Introduction to control problem- Industrial Control examples. Mathematical modeling, differential equations, transfer function of system response. potentiometers, synchros, LVDT, dc and ac servomotors, tacho-generators, electro hydraulic valves, hydraulic servomotors, electro pneumatic valves, pneumatic actuators. Closed-loop systems. Block diagram and signal flow graph analysis.

Module II: (6 Hrs)

Time response of second-order systems, steady-state errors and error constants. Performance specifications in time-domain. Proportional, integral and derivative systems.

Module III: (6 Hrs)

Feedback control systems- Stability, steady-state accuracy, transient accuracy, stability concept, relative stability, Routh Hurwitz stability criterion.

Module IV: (6 Hrs)

Root locus method of design. Effect of adding pole and zero in proximity of imaginary axis.Lead and lag compensation.

Module V: (6 Hrs)

Frequency-response analysis- Polar plots, Bode plot, stability in frequency domain, Nyquist plots. Nyquist stability criterion. Performance specifications in frequency-domain.

Module VI: (6 Hrs)

State variable Analysis- Concepts of state, state variable, state model, state models for linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability & observability. Introduction to Optimal control system.

Text/Reference Books:-

1. Gopal. M., "Control Systems: Principles and Design", Tata McGraw-Hill, 1997.
2. Automatic Control Systems, 9th Edition , Farid Golnaraghi, Benjamin C. Kuo , June
3.Modern Control Engineering; Katsuhiko Ogata; Prentice Hall. , 2010 - Technology & Engineering.
4. Control Systems Engineering, I. J. Nagrath, M. Gopal, New Age International Publishers, 2005 Edition .
6. Automatic Control System by Hasan Saeed

SYLLABUS OF V SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE : EDT351 **COURSE NAME : ELECTROMAGNETIC WAVES**

L: 03HRS, T: 00 HR., PER WEEK **TOTAL CREDITS: 3**

Course Outcomes:

After completion of the course student will be able to:

1. Understand the wave propagation in transmission lines and waveguides. Use the smith chart as a graphical tool to solve impedance matching issues.
2. Explain the principle of radiation from an antenna/array, its characteristics, structure, design, limitations and trade-offs.
3. Apply the knowledge of transmission lines, waveguides and antenna propagation for different communication systems.

Syllabus

Module I: (8 Hrs)

Transmission Lines: Types of Transmission lines, Applications of Transmission lines, Equivalent circuit of a pair of Transmission lines, Primary constants, transmission line equations, Secondary constants, Distortion less Transmission lines, Phase & Group velocities, Input impedance of Transmission line, Loading of Lines, RF lines, Lossless transmission lines, Relation between reflection coefficient, load and characteristic impedance, Relation between reflection coefficient and voltage standing wave ratio, Line of different lengths $\lambda/8$, $\lambda/4$, $\lambda/2$, Losses in Transmission lines, Impedance transformation, Impedance matching with single and double stubs.

Module II: (4 Hrs)

The Smith Chart and its applications: Introduction to Smith Chart, Admittance Smith Chart and Applications of transmission lines: Impedance Matching Techniques, using transmission line sections as circuit elements.

Module III: (6 Hrs)

Guided waves: Waves between parallel planes, TE and TM waves, characteristics of TE and TM waves, TEM waves, Velocities of propagation, Wave Impedance.

Wave guides: Rectangular wave-guides, TE & TM modes in wave-guides, Wave Impedance in rectangular waveguides.

Module IV: (6 Hrs)

Antenna Fundamentals: radiation from an alternating current element, Induction field, radiation field, power radiated by a current element, radiation by a half wave dipole, radiation resistance of dipole & monopole, Isotropic radiator

Antenna Parameters: Radiation pattern, power pattern, field pattern Radiation intensity, Antenna impedance, mutual impedance, gain and directivity, bandwidth, Polarization, efficiency, effective length, area or aperture,

scattering loss, physical aperture, half wave antenna, effective length, front to back ratio, Antenna beam width and side lobes.

Module V: (6 Hrs)

Basic Antennas: Monopole and Dipole antenna, two element array and their directional characteristics, linear array analysis, broadside and end fire arrays, pattern multiplication and binomial arrays. Phased array antenna ,Microstrip antennas -Radiation from rectangular and circular patches, feeding techniques, Introduction Smart Antenna

Module VI: (6 Hrs)

Practical antennas: Horn antenna, Parabolic reflector antenna etc.

Radio Wave Propagation: Propagation in free space, Friss Transmission formula, Path loss and Link budget calculation, Multipath Fading, tropospheric propagation, Super refraction.

Text Book:

1. Electromagnetic waves & Radiating Systems- E.C. Jordan & K.G. Balmain, PrenticeHall, India, 2nd Edition.
2. Antenna Theory: Analysis and Design – Constantine A. Balanis, John Wiley & Sons, 3 rd Ed., 2009.

Reference Books:

1. Electromagnetic Waves by R.K. Shevgaonkar, Tata McGraw Hill India, 1st Edition, 2005.
2. Engineering Electromagnetics by N. Narayana Rao, Prentice Hall, 3rd Edition, 1997.
3. Fields and Wave Electromagnetics by David Cheng, Prentice Hall, 2nd Edition, 2002.

SYLLABUS OF V SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE : EDT352 **COURSE NAME : CMOS DIGITAL CIRCUIT DESIGN**

L: 03HRS, T: 01 HR., PER WEEK **TOTAL CREDITS: 4**

Course Outcomes:

1. Analyze and design NMOS, PMOS and CMOS digital circuits and interconnect.

2. Estimate various performance metrics for digital circuits.

3. Analyze memory Elements.

Syllabus

Module I: (8 Hours)

Overview of VLSI Design Methodology, Design Flow & hierarchy, Introduction to MOS Transistors, Threshold voltage, body effect, MOS device design equations, second order effects, MOS Models-Level-1, Level-2, Level-3.

Module II: (8 Hours)

Static Load MOS Inverters, CMOS Inverter: The Static Behavior, Switching threshold, Noise Margins, The Dynamic Behavior, Power, Energy, and Energy-Delay, the Tri State Inverter, Transmission Gate. CMOS fabrication process flow, N-well, P-well, Twin-tub process flow, Silicon on insulator, Latch-up, Layout design rules (DRC).

Module III: (7 Hours)

Circuit Characterization and Performance Estimation: Introduction, Resistance Estimation Capacitance Estimation, CMOS gate transistor sizing, Driving Large capacitive loads, Scaling of MOS transistors.

Module IV: (9 Hours)

Designing combinational logic gates in CMOS: Complementary CMOS, Ratioed Logic, Pass-Transistor Logic, Dynamic CMOS Design, Dynamic Logic: Basic Principles, Issues in Dynamic Design, Cascading of Dynamic Gates, Domino Logic.

Module V: (7 Hours)

Sequential logic design: Timing Metrics for Sequential Circuits, Classification of Memory Elements, Static Latches and Registers, Dynamic Latches and Registers

Module VI: (6 Hours)

Clocking Strategies, CMOS Sub-system design:-SRAM, DRAM.

Text Books:

1. Digital Integrated Circuits: A Design Perspective: J. Rabaey, 2nd edition PHI

Reference Books:

1. CMOS VLSI Design: A circuits and systems perspective: N. Weste and K. Eshranghian, 2nd edition, PHI

2. CMOS Digital Integrated Circuits Analysis & Design: S M Kang, Yusuf Lablebici, 3rd edition TMH

3. VLSI Design Technique for Analog and Digital Circuit: Randel Geiger, P Allen, N Strader, 2nd edition TMH

4. Introduction to VLSI System: Carver Mead, Lynn Conway, 1st edition Addison-Wesley

5. MOS Integrated Circuits- Theory, Fabrication, Design and System Applications of MOS LSI: William M. Penny, Lillian Lau, Van Nostrand Reihold Company. 1st edition

6. Basic VLSI Systems and Circuits: Dougles Pucknell and K. Eshraghian 3rd edition , PHI

SYLLABUS OF V SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE : EDT353 **COURSE NAME : ELECTRONIC INSTRUMENTATION**

L: 03HRS, T: 00 HR., PER WEEK **TOTAL CREDITS: 3**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the working principle of instrumentation system.
2. Design instrumentation system suitable for required parameter measurement.
3. Describe working principle of various sensing devices.

Syllabus

Module I: (**6 Hrs**)

Errors and analysis in measurement, Basics of Instrumentation System, components: Sensing elements .transducers, actuators, display, introduction to transducers and their classification and types.

Module II: (**5 Hrs**)

Instrumentation systems for temperature measurement, Contact type sensors and non-contact type sensors.

Module III: (**4 Hrs**)

Instrumentation system for Pressure Measurement, classification of pressure: High and low pressure measurement sensors.

Module IV: (6 Hrs)

System for measurement displacement, force and torque: Resistive, inductive and capacitive transducers for measurement of displacement, force, torque, velocity and acceleration.

Module V: (**8 Hrs**)

Instrumentation for real world monitoring: Standards, working principle, design criterion: PH, humidity, magnetic, flux, electrical conductivity. Light intensity, air monitoring.

Module VI: (**6 Hrs**)

Grounding and shielding, isolation: Grounding concepts, ground loop, isolation amplifier, instrumentation amplifier, 4 -20 mA current converter for instrumentation, and Case study of parameter acquisition, processing and display methods.

Text Book:

1. Electrical & Electronic Instruments & Measurement by A. K. Sawhney, Dhanpat Rai and Co. 19th Edition, 2015.

Reference Books:

1. Electronic Instrumentation & Measurement Technique by W.D. Cooper & A.D. Helfrick, Prentice Hall, 3rd revised Edition, 1985.
2. Process Measurement and Analysis by B. G. Liptak, Chilton Book Company, 4th Edition, 2003.

SYLLABUS OF V SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE : EDT355-1 **COURSE NAME : EMBEDDED SYSTEM DESIGN AND RTOS**

L: 03HRS, T: 00 HR. P: 00 HRS, PER WEEK **TOTAL CREDITS: 3**

Course Outcomes:

1. Understand the architecture and organization of ARM microcontroller and its programming
2. Acquire the knowledge, techniques and skill to integrate microcontroller hardware and software
3. Understand the concept of real time operating system architecture.
4. Interface microcontroller based system to real world.

Module I:: (4Hrs)

Introduction to embedded System, RISC Principles, ARM Processor Families, Processor ARM, Thumb, Thumb2 Instruction , AMBA Bus Architecture.

Module II: (6hrs)

ARM Processor Architecture, Processor Modes, Register organization, Exception Handling, Pipelining,ARM And Thumb Instruction Set .Assembly Language programming

Module III: (4Hrs)

Interfacing of internal and External Peripherals: GPIOs, Timers, ADC, PWM,DAC, Timers, RTC.

Module IV: (6Hrs)

Communication Protocols: I2C, SPI, UART, MODBUS, USB and its Interfacing with ARM Microcontroller.

Module V: (6Hrs)

RTOS Concepts-Critical section, Shared Resources, Context Switching, Pre-emptive and non pre-emptive Schedulers, Priority Inversion, Mutual exclusion, Synchronization, Inter task communication mechanisms, Interrupt Latency, Scheduling algorithm.

Module VI: **(6Hrs)**

Structure of µCOS-II: Introduction to µCOS-II-, kernel structure, Task States, Inter task communication, Task Scheduling, Task Synchronization, Critical section, Shared Resources, Context Switching, Priority Inversion, Mutual exclusion, Interrupt Latency.

Text books:

1. ARM System Developer's Guide: Designing and Optimizing System Software, A. Sloss, D. Symes, C.Wright, Morgan Kaufman Publication, 1st Edition.

Reference Books:

1. ARM Assembly Language: Fundamentals and Techniques by William Hohl, CRC Press, 2nd Edition.
2. ARM System-on-Chip Architecture, S. Furber, A. Wesley, 2nd Edition.
3. An Embedded Software Primer David E. Simon Pearson Education, 1st Edition.
4. F.Vahid and T.Givargis, “Embedded System Design: A unified Hardware /Software Introduction”, Wiley India Pvt Ltd.
5. MicroC/OS-II The Real Time Kernel, Jean Labrosse, CMPBooks, 2nd Edition.

SYLLABUS OF SEMESTER V B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE: EDT355-2 **COURSE NAME : ELECTRONICS SYSTEM DESIGN (PROGRAM ELECTIVE-1)**

L: 3 Hrs , T: 0 Hr., P: 0 Hr Per week **Total Credits-03**

Course Outcomes

Upon the completion of this course, students will demonstrate the ability to:

1 Interpret the data using data manuals related to the specification of circuit/system.

2 Apply knowledge of basic electronics devices in electronic circuit/systems to meet the needs with realistic constraints.

Syllabus

Module I: (6 Hrs)

Integrated Regulators: Linear Design aspects of integrated regulators LM78xx, LM79xx, LM317, LM723, Protection circuits.

Module II: (6 hrs)

Switching Regulators: Design aspects of Switching regulators, Design of boost type SMPS, Buck Type SMPS, LM78S40, and DC-DC Converters.

Module III: (8 hrs)

Power Amplifiers Design: Power amplifier fundamentals and Classification based on application, Design aspects of Audio Power Amplifiers, Design aspects of class D switching amplifier, Design aspects of integrated power amplifier TBA810, TDA 2005.

Module IV: (8 hrs)

Oscillator Design: fundamentals of sinusoidal oscillators, Performance specification, Design aspects of VCO, PLL- Introduction, Concept of Synchronization, Basic Structure of PLL, Transfer function, PLL Applications.

Module V: (6 hrs)

Isolation Amplifier and Data acquisition system: Architecture of Isolation amplifier, Grounding and shielding, Architecture of DAC and ADC, Design aspects of Data acquisition system.

Module VI: (6 hrs)

Filter Design: Design of active Butterworth filters upto sixth order, Infinite Gain Multiple Feedback filter, Sallen Key filters.

Text Books:

1. A Monograph on Electronic Design Principles, N.C. Goyal , R.K. Khetan, Khanna Publications, 5th Edition.

Reference Books:

1. TI - Design considerations for class D audio Power Amplifiers, Application report
2. Texas Instruments Datasheets Catalog. TI - Op amps for Everyone, Ron Mancini, Design reference manual.4. Regulated Power supply Handbook, Texas Instruments.

SYLLABUS OF SEMESTER V B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE: EDT355-3	**COURSE NAME: SHELL SCRIPTING AND PYTHON**
L: 03Hrs, T: 00 Hr., per week	**TOTAL CREDITS: 3**

Course Outcomes:

Upon completion of the course students will be able to:

1. Understand the basics of Python.
2. Create and execute Python programs.
3. Understand the basics of operating system and shell scripting.
4. Create and execute the script.

Syllabus

Module I : **(7Hrs.)**

Introduction to Python: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Control Flow Statements, Exceptions handling.

Module II: (7Hrs.)

Functions modules and packages: Built-In Functions, Function Definition, Calling and return statement. Understanding Packages, Programming using functions, modules and external packages.

Module III: (6Hrs.)

Python string, list and dictionaries manipulation: Basic String Operations, List manipulation, Dictionary manipulation, Programming using string, list and dictionary in build functions.

Module IV: (7Hrs.)

Python File Operation: Basic file operations using python**,** Programming using file operations. Introduction to Python object oriented Programming.

Module V: (6Hrs.)

Introduction to operating system: Basics of Linux operating system, structure of Linux OS, file system, and basic Linux commands.

Module VI: (7Hrs.)

Introduction to shell scripting: The Shell Variables and Environment, Conditionals Execution (Decision Making), Loops, Shell Redirection, Pipes and Filters, Functions, writing of interactive scripts.

TEXT BOOKS:

1. Gowrishankar S, Veena A, “Introduction to Python Programming”, 1st Edition, CRC Press/Taylor & Francis, 2019. ISBN-13: 978-0-8153-9437-2.
2. Richard Blum, Christine Bresnahan, “Linux Command Line and Shell Scripting Bible” 3rd Edition, Kindle Edition.

REFERENCE BOOKS:

1. David I. Schneider “An Introduction to Programming using Python” Pearson Education Limited 2016.
2. Daniel P. Bovet, Marco Cesati, “Understanding the Linux Kernel”, 3rd Edition, 2005, O'Reilly.

SYLLABUS OF SEMESTER V B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EDT398-1 **COURSE NAME : PCB DESIGN (OPEN ELECTIVE -2)**
L: 03Hrs, T: 00 Hr., per week **TOTAL CREDITS: 3**

Course Outcomes

Upon the completion of this course, students will demonstrate the ability to:

1. Understand basics of PCB designing.
2. Apply advance techniques, skills and modern tools for designing and fabrication of PCBs.
3. Apply the knowledge and techniques to fabricate Multilayer, SMT and HDI PCB.
4. Understand concepts of Packaging.

Syllabus

Module I: (7 Hrs)

Introduction to Printed circuit board: fundamental of electronic components, basic electronic circuits, Basics of printed circuit board designing: Layout planning, general rules and parameters, ground conductor considerations, thermal issues, check and inspection of artwork.

Module II: (5hrs)

Design rules for PCB: Design rules for Digital circuit PCBs, Analog circuit PCBs, high frequency and fast pulse applications, Power electronic applications, Microwave applications,

Module III: (10 hrs.)

Introduction to Electronic design automation(EDA) tools for PCB designing : Brief Introduction of various simulators, SPICE and PSPICE Environment, Selecting the Components Footprints as per design, Making New Footprints, Assigning Footprint to components, Net listing, PCB Layout Designing, Auto routing and manual routing. Assigning specific text (silkscreen) to design, Creating report of design, creating manufacturing data (GERBER) for design.

Module IV: (6hrs)

Introduction printed circuit board production techniques: **Module IV: (6 hrs):** Photo printing, film-master production, reprographic camera, basic process for double sided PCBs photo resists, Screen printing process,

plating, relative performance and quality control, Etching machines, Solders alloys, fluxes, soldering techniques, Mechanical operations.

Module V: (6hrs)

PCB Technology Trends: Multilayer PCBs. Multiwire PCB, Flexible PCBs, Surface mount PCBs, Reflow soldering, Introduction to High-Density Interconnection (HDI) Technology.

Module VI: (6 hrs)

PCB design for EMI/EMC: Subsystem/PCB Placement in an enclosure, Filtering circuit placement, decoupling and bypassing, Electronic discharge protection, Electronic waste; Printed circuit boards Recycling techniques, Introduction to Integrated Circuit Packaging and footprints, NEMA and IPC standards,.

Text Books:

1. Printed circuit board design ,fabrication assembly and testing By R. S. Khandpur, Tata McGraw Hill 2006

Reference Books:

1.Printed circuit Board Design and technology, Walter C. Bosshart
2. Printed Circuits Handbook, Sixth Edition, by Clyde F. Coombs, Jr, Happy T. Holden, Publisher: McGraw-Hill Education Year: 2016
3. Complete PCB Design Using OrCAD Capture and PCB Editor, Kraig Mitzner Bob Doe Alexander Akulin Anton Suponin Dirk Müller, 2nd Edition 2009.
4. Introduction to System-on-Package, Rao R Tummala & Madhavan Swaminathan, McGraw Hill, 2008.
5. EMC and Printed circuit board ,Design theory and layout, Mark I Montrose IEEE compatibility society
6. Flexible Printed circuit board Design and manufacturing ,By Robert torzwell
7. Web-based Current literature.

SYLLABUS OF SEMESTER VI B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : HUT 355 **COURSE NAME : PRINCIPLES OF ECONOMICS AND MANAGEMENT**

L: 03HRS, T: 00 HR., PER WEEK **TOTAL CREDITS: 3**

Course Outcomes:

CO1: Students will recall important concepts of economics.

CO2: Students will understand various concepts of demand and supply.

CO3: Students will apply the knowledge of Indian Economy in their professional career.

CO4: Knowledge of management and administration will sharpen analytical abilities of learners.

CO5: Theories of motivation and leadership will help the students to evaluate any professional situation in realistic way.

CO6: Knowledge of business will help the students to create and develop their own enterprise/business.

Syllabus

Unit I: Micro Economics:

Introduction to Economics: Definitions and scope, nature, methods, Central Economic Problems, basic concepts: value, utility, investment, savings, income, wealth, equilibrium

Unit 2: Managerial Economics

Nature of managerial decision-making, types of business decisions, Theory of Demand and Supply: Law of Demand and supply, its determinants, exceptions, and elasticity, Types of Market and price-output determination,

Unit 3: Macro Economics (in context of Indian Economy):

Structure of Indian Economy, **National Income in India:** Basic Concepts- GDP, GNP, NDP, NNP, FID, NFIA, per capita Income, **Banks:** Central Banks (Function and Credit control) Commercial Bank (Functions and credit creation), NBFSs, Inflation, Phrases of Business cycle, **Taxation** (Direct, Indirect/GST)

Unit 4: Introduction to Management

Definition of management, difference between management and administration, evolution of management, functions of management, **functions of management:** planning (PESTLE model), direction, controlling.

Unit 5 Motivation and Leadership

Motivation: Concept and Definition, Types, Importance –Theories of Motivation – (any 2), Empowering employees, Leadership: Concept and Definition, Importance, Styles of Leadership, Skills of a leader, Theories of Leadership-(any 2)-Leader vs. Manager.

Unit 6: **Entrepreneurship, venture management and business:**

Entrepreneurial Product-Market Strategies Feasibility, Assessing Business Entry Strategies, Organizing a Business Plan, Financing the Small Business, Marketing Management, Financial Management, Operations Management, Human Resource Management, Business Management.

Text Books:

1.Dewett.K.K., *Modern Economic Theory*, S. Chand, New Delhi, 2006.

1. Ahuja H.L., *Managerial Economics, Analysis of managerial Decision making*, S.Chand and company Limited, New Delhi , 9th edt. 2017.
2. Dutt. R., and Sundharam M.P.K., *Indian Economy*, S. Chand and Company Ltd, New Delhi, 1965.
3. Tripathi ,C.P., Reddy, .N.P., *Principles of Management* , Tata McGraw Hill Education Private Limited, New Delhi, 2012
4. Verma,J.D., Dewett, K.K., Sharma, M.L., *Elementary Indian Economics*, S. Chand Publishing, New Delhi, 1949.
5. Nandan H., *Fundamentals of Entrepreneurship*, PHI Learning Private Limited Delhi, 3rd Edt. 2013.
6. K. Aswathappa (2008) 'Human Resource Management' The McGraw-Hill Companies.

Reference Books

1. Upadhyay, A.K., *Principles of Economics,* Vikas Publishing, Nodia, 2014

2.Dwivedi D.N., *Managerial Economics*, Vikas publishing house Pvt.Ltd, Nodia, 8th edt.2015.

SYLLABUS OF SEMESTER VI B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE : EDT357 **COURSE NAME : OBJECT ORIENTED PROGRAMMING**

L: 02Hrs, T: 00 Hr., Per week **TOTAL CREDITS: 2**

Course Outcomes

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

1. Use of the Java programming language in the development of small to medium-sized application programs.
2. Understand the principles of object-oriented programming; create classes, instantiate objects and invoke methods.
3. Implement exception handling mechanism and use collection classes to design applications.
4. Demonstrate an introductory understanding of graphical user interfaces

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Syllabus

Module I: (7 Hrs)

Introduction to Java: of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, String Class, Math class, Arrays in java.

Module II: (10 hrs)

Features of Object Oriented Programming: Data encapsulation, inheritance, methods of derivation, use of this, super and final keyword in inheritance, polymorphism and late binding, concept of a class, Abstract classes and methods, interface, implementation of interface, creating packages, importing packages, static and non-static members Access control of members of a class, instantiating a class, constructor and method overloading.

Module III: (7 hrs)

Exceptions: types of exception, use of try catch block, handling multiple exceptions, using finally, throw and throws clause, user defined exceptions.

Collection classes: Array list, Linked list, Hash set, Queues, Trees. Introduction to streams, byte streams, character streams, file handling in Java.

Module IV: (6 hrs)

Event and GUI programming : Swing Components and Containers, JLabel, JTextField, JList, JCombobox, Swing Buttons (button, toggle button, checkbox, radio button), JTable, JTabbed Pane Event handling mechanism, Event Classes, Event Listener interfaces.

Text Books:

1. Herbert Schildt, "JAVA The Complete Reference"; 11th Edition, Tata McGraw- Hill Publishing Company Limited, 2018.
2. Paul Deitel & Harvey Deitel, "Java How to Program"; 11th Edition, Pearson India Education Pvt. Ltd, 2018.
3. E. Balagurusamy, "Programming with Java"; 6th Edition, Tata McGraw Hill Education Pvt. Ltd, 2019.

Reference Books:

1. Cay S. Horstmann and Gary Cornell; Core JAVA Volume-II Advanced Features; Eighth Edition; Prentice Hall, Sun Microsystems Press 2008.
2. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGrawHill Education Private Ltd 2013.

SYLLABUS OF VI SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE: EDT358 COURSE NAME: ELECTROMAGNETIC COMPATIBILITY

L: 2 Hrs , T: 0 Hr., P: 0 Hr. Per week TOTAL CREDITS-02

Course Outcomes

After completion of this course student is able to:-

1. Understand fundamental requirement of electromagnetic compatibility
2. To estimate the radiated emissions, conducted emissions and susceptibility
3. Redesign the circuit for EMC requirement
4. To design the architecture of electronic product for EMC requirement.

SYLLABUS

UNIT I : Fundamental of EMI/EMC (7Hrs)

Introduction to Electromagnetic Compatibility: Aspects of EMC, Electrical Dimension waves. EMC requirement of Electronic system: - Government requirement of Commercial product and military product, Measurement of Emission for verification of compliance - Radiated emission and conducted emission. Additional product requirement – radiated susceptibility, conducted susceptibility, Electrostatic Discharge (ESD), requirement of commercial vehicle, Advantages of EMC.

UNIT II: Non – ideal Behavior of Components (5Hrs)

Non – ideal Behavior of Components: Wires, PCB lands, component leads, Resistors, inductors, capacitors, Ferrite Beads, common mode chokes, Electromechanically Devices, Digital circuit device, mechanical switches. Spectrum Analyzer, signal integrity. Antennas and their characteristics.

UNIT III: Conducted Emission &susceptibility (6Hrs)

Conducted Emission and susceptibility: measurement of conducted emission, LISN, power supply filters, Power supplies, Radiated emission and susceptibility.

UNIT IV: Shielding, Grounding, System design for EMC (7Hrs)

Cabling, Cables Shielding. Source Shielding, Receptor Shielding Near Field Far fields. Shielding Effectiveness, Losses. Grounding. Single point, Multi point, Hybrid grounds. Grounds loop problems. Low frequency and High frequency analysis of Common Mode Choke

System Design for EMC, System configuration, Diagnostic Tools

TEXT BOOKS

1. Henry W. Ott ,"Electromagnetic Compatibility Engineering " , Publisher: John

Wiley & Sons August 2009.

REFERENCES AND REFERENCE BOOK

1. Henery Ott, " Noise Reduction Technique",. Willy science

2. Mark I Montrose, "EMC and Printed circuit board, Design theory and layout", IEEE compatibility society

3. www.emctest.com:- EMC Test Systems EMC Antennas/Chambers/TEM Cells

4. www.fair-rite.com :- Ferrite Cores & Beads

5. www.emcs.org :- IEEE EMC Society

6. http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/

   reflist/emc.html European commission

7. www.emicatalog.com:- EMI Catalog , Web Based Catalog of EMC Products &

   Services

SYLLABUS OF VI SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE : EDT359 **COURSE NAME : ANALOG AND DIGITAL COMMUNICATION**

L: 03HRS, T: 01 HR., PER WEEK **TOTAL CREDITS: 4**

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth.
2. Analyze the behavior of a communication system in presence of noise.
3. Investigate pulsed modulation system and analyze their system performance.
4. Analyze different digital modulation schemes and can compute the bit error performance.

Module-1 (8 Hrs)

Review of signals and systems & Amplitude Modulation Techniques: Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Noise in amplitude modulation systems, AM Super heterodyne receiver

Module-2 (10 Hrs)

Angle Modulation Techniques: Representation of FM and PM signals, Spectral characteristics of angle modulated signals. Noise in Frequency modulation systems, Pre-emphasis and De- emphasis, Threshold effect in angle modulation, FM Super heterodyne receiver

Module-3 (7 Hrs)

Introduction to Information Theory & Pulse Modulation Techniques: Channel capacity theorem, Sampling Theorem, Pulse modulation techniques, Pulse code modulation (PCM), and Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing

Module-4 (10 Hrs)

Geometric Representation of signals & Digital Modulation Schemes: Gram Schmidt Orthogonalization, Inter symbol Interference, eye pattern, Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation.

Module-5 (10 Hrs)

Performance Analysis of Digital Communication Systems: Optimum demodulation of digital signals over band-limited channels, Maximum Likelihood sequence detection (Viterbi Receiver), Synchronization and Carrier Recovery for Digital Modulation.

Text Books:

1. Lathi B. P. and Ding Zhi, "Modern Analog and Digital Communication Systems", Oxford University Press, Fourth Edition, 2011.

Reference Books:

1. Haykin S. and Moher M., "Introduction to Analog and Digital Communications", John Wiley & Sons, Second Edition, 2012.
2. Haykin S., "Communication Systems", John Wiley & Sons, Fourth Edition, 2006.
3. Tomasi W., "Electronic Communications System: Fundamentals Through Advanced", Pearson Education, Fifth Edition, 2008.

SYLLABUS OF VI SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE: EDT360-1 COURSE NAME: COMPUTER ARCHITECTURE AND ORGANIZATION

L: 03Hrs, T: 00 Hrs, per week TOTAL CREDITS: 3

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Evaluate common principles of computer organization and classify RISC/CISC architecture.
2. Design and analyze different arithmetic algorithms, processor data path and control Unit.
3. Apply the concept of cache and virtual memory management in computer system.
4. Investigate pipelining and multiprocessing for computer system design.

Syllabus

ModuleI: (4Hrs)

Introduction to computer system and its sub modules, Introduction to RISC and CISC paradigm, Performance Equation, Common Principles of Computer organization: Amdahl's Law, Principle of Locality.

Module II: (6 Hrs)

Processor organization, instruction set, instruction formats, Arithmetic for Computers: Addition and Subtraction, Multiplication, Division, IEEE 754 floating point format.

Module III: (7 Hrs)

Processor Design-Introduction, Datapath and control unit design, Performance Considerations, Multi-cycle design, Micro Programmed control design, Exception Handling.

Module IV: (7 Hrs)

Motivation for Pipelining, Clock period and CPI, Pipelined datapath, graphical representation, Pipelining Hazards.

Module V: (7 Hrs)

Memory organization, concepts of semiconductor memory, memory management, concept of
Cache and associative memories, virtual memory.

Module VI: (4 Hrs)

Parallel processing concepts, multiprocessors and its characteristics. Input/Output Subsystem:-Interfaces and buses, I/O Operations, Designing I/O Systems.

Text Books:

1. Computer Organization and Design - The Hardware/Software Interface, David A. Patterson, John L. Hennessy, Fifth Edition, Morgan Kaufmann Publications, 2014.

2. Computer Organization and Architecture: Design for Performance, William Stallings Tenth Edition, PHI, 2016.

Reference Books:

1. Computer Architecture and Organization, Third Edition (Fifth Reprint), J. P. Hayes McGraw Hill, 2012.
2. Computer Architecture and Parallel Processing, Kai Hwang, Faye A. Briggs McGraw Hill, 2012.
3. Computer Organization, Safwat G. Zaky, Zvonko G. Vranesic, Carl Hamacher, Fifth Edition, McGraw Hill, 2002.
4. Andrew. S. Tanenbum Structured Computer Organization, Fifth Edition, Pearson, 2005.

SYLLABUS OF VI SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE: EDT360-2 **COURSE CODE: DIGITAL SYSTEM DESIGN**

L: 3 Hrs, T: 0 Hr., P: 2 Hr Per week **TOTAL CREDITS-03**

Course Outcomes

Upon completion of this course student will be able to:-

1. Design, model, synthesize & optimize the processor.
2. Analyze the timing issue and implementation on FPGA.
3. Understand the design methods of Asynchronous sequential circuit.

Syllabus:

Unit -1: FPGA architecture (7Hrs)

FPGA Architecture -Architecture Alignment, Lower Power Differentiation, FPGA Layout, Clock Regions and I/O Banks, CLB Structure, Block RAM, DSP Slice, Input/output Blocks. Dedicated IP in the FPGAs:-High-Speed Serial I/O Transceivers, PCI Express, and XADC: Dual 12-Bit ADCs, Multi-Gigabit Tran receiver

Unit 2: Design of processor (8Hrs)

Sequential logic Design- Controller (FSM), Sequential logic description using Verilog.Data path component –Register, adder, shifter, comparator, counter, multiplier, ALU, register files, Memory. Register transfer level design of processor for small application such as vending machine.RTL level Verilog modeling.

Unit 3: Pipelined processor (7Hrs)

Basics of pipelining concepts, speed up, efficiency, pipeline modeling, pipeline implementation of processor.

Unit4: Synthesis and report analysis (7Hrs)

Introduction to synthesis, synthesis constraint, stages of synthesis, technology mapping. Place & route process. Analysis of synthesis report generated by tools.

Unit 5: Timing and clocking (07 Hrs)

Static Timing Analysis, SOC /FPGA clocking -jitter, skew ,drift ,High rate, Clock tree synthesis, Synchronizer, Muti clock domain digital design ,Utilizing the resources of FPGA for multiclock design.

Unit 6: Introduction to asynchronous circuit design (8Hrs)

Asynchronous Sequential circuits: Advantages of Asynchronous circuits over synchronous, classification-SI, DI, QDI, fundamental mode, pulse mode, primitive flow table, synthesis, state assignment in Asynchronous Sequential circuits, Analysis of essential hazards with the primitive flow table, Incompletely specified machines.

Text books

1. Verilog HDL: A guide to Digital Design and Synthesis: Samir Palnitkar, Prentice Hall (1996)

2. Advanced Digital Design with the Verilog HDL: M.D. Ciletti, Prentice Hall, (2003).

3. Synthesis and Optimization of Digital Circuits, G. De Micheli, McGraw-Hill, (1994).

4. Asynchronous Circuit Design. Chris J. Myers, by John Wiley & Sons, Inc. (2001)

Reference books:

1. The Verilog Hardware Description Language, Fifth Edition: Donald E. Thomas, Philip R. Moorby, Kluwer Academy Publisher. (2002).

2.DigitalSystemsDesignUsingVHDL,SecondEdition:CharlesH.Roth.Jr.,LKurianJohn,CengageLearning,(2008).

3. Logic Synthesis using Synopsys, Second edition, P. Kurup and T. Abbasi, Kluwer, (1996)

4. Logic synthesis and verification algorithms: Gary D. Hachtel, Fabio Somenzi, Springer (1996)

5. An Engineering Approach to Digital Design: W. Fletcher. Prentice Hall.

SYLLABUS OF VI SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE : EDT360-3 **COURSE NAME : DESIGNING THE INTERNET OF THINGS**

L: 03HRS, T: 00 HR., PER WEEK **TOTAL CREDITS: 3**

Course Outcomes:

After learning the course, the student will be able:

1. To demonstrate the Internet of Things.
2. To use the application layer protocols for IoT applications.
3. To prototype the embedded systems and online components of IoT.

Syllabus

Module I: (5 Hrs)

Introduction to IOT, Equation of IOT, Flavors of IOT, Enchanted objects, Affordances, Machine to Machine (M2M), Web of Things (WOT)

Module II: (8 Hrs)

The IP Protocol Suite (TCP/IP), UDP, IP Addresses, DNS, Static IP Address Assignment, Dynamic IP Address Assignment, IPv6, MAC Addresses, TCP and UDP Ports, Application Layer Protocols: HTTP, Encrypted HTTP, Other Application Layer Protocols.

Module III: (6 Hrs)

Prototypes and Production, Costs versus Ease of Prototyping, Changing Embedded Platform, Open Source versus Closed Source, Mixing Open and Closed Source, Memory Management, Types of Memory, Making the Most of Your RAM, Performance and Battery Life, Libraries.

Module IV: (8 Hrs)

Electronics, Sensors, Actuators, Microcontrollers, System-on-Chip, Choosing the embedded Platform.

Module V: (4 Hrs)

Introduction to API, Mashing up of APIs, Case studies, MQ Telemetry Transport (MQTT) protocol.

Module VI: (4 Hrs)

Smart city, Smart parking, Smart home, Agriculture, Healthcare, etc.

Text Book:

1. Designing the Internet of Things by Adrian McEwen and Hakim Cassimally, John Wiley and Sons, Ltd., 1st Edition.

Reference Books:

1. Internet of Things, Architecture and Design principles by Raj Kamal, McGraw Hill education (India) Pvt. Ltd. 1st Edition.
2. Learning of Internet of Things by Peter Waher, Packt Publishing, 1st Edition.

SYLLABUS OF VI SEMESTER B.E. (ELECTRONIC DESIGN TECHNOLOGY)

COURSE CODE : EDT360-4 **COURSE NAME : MACHINE LEARNING**

L: 03 HRS, T: 00 HR., PER WEEK **TOTAL CREDITS:3**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the fundamental concepts, and challenges of machine learning: data, model selection, Model complexity, etc. and its applications to solve real-world problems.
2. Compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
3. Understand the concept of deep neural network and explore deep learning technique for solving Real-world problems in various domains.
4. Design and implement machine learning solutions to classification, regression, and clustering Problems with Python programming language and test them with benchmark data sets.

Syllabus

Module I: (5 Hrs)

Introduction to machine learning, the concept learning task, Inductive Learning Bias, FIND-S and Candidate-Elimination algorithm, Decision Trees, Basic decision trees learning algorithm, inductive bias in decision tree learning, overfitting.

Module II: (6 Hrs)

Supervised learning algorithms: Linear and Logistic Regression – Bias/Variance Trade-off, Regularization, Variants of Gradient Descent, Support Vector Machines, Kernel functions in SVM, K-Nearest Neighbors, and Applications.

Module III: (7 Hrs)

Artificial Neural Networks, Perceptron, Multilayer networks and Backpropagation algorithm, Introduction to Deep Neural networks, Recurrent Neural Networks (RNNs) and Convolutional Neural Networks (CNNs).

Module IV: (6 Hrs)

Probabilistic Machine Learning- Bayesian learning and Bayesian networks, Gibbs algorithm, Naive Bayes classifier; Bayes optimal classifiers, Maximum Likelihood Estimation, MAP; Gaussian Discriminant Analysis.

Module V: (6 Hrs)

Unsupervised learning algorithms: Instance based learning, K-Means clustering, Expectation Maximization, and Gaussian Mixture Models. Dimensionality Reduction-PCA, LDA, and Feature Selection, PAC Learnability, Reinforcement Learning, Multi-class Classification.

Module VI: (5 Hrs)

Applications of machine learning to Information Retrieval, Computer Vision, Natural Language Processing, and applications on the web.

Text Books:

1. Machine Learning: A Probabilistic Perspective by Kevin P. Murphy, Francis Bach, MIT Press, 2012.
2. Pattern Recognition and Machine Learning by Christopher M. Bishop, First edition, Springer, 2006.

Reference Books:

1. The Elements of Statistical Learning Data Mining, Inference, and Prediction by Trevor Hastie, Robert Tibshirani, Jerome Friedman, 2nd Edition, Springer, 2009.
2. Machine Learning by Mitchell Tom 1st Edition, McGraw Hill, 1997.
3. Deep Learning by Ian Good fellow, Yoshua Bengio, Aaron Courville & Francis Bach, MIT Press, 2017.
4. Introduction to Machine Learning by Ethem Alpaydin, 3rd Edition, PHI Learning, 2015.
5. Machine Learning: An Algorithmic Perspective by Stephen Marsland, Second Edition, Chapman And Hall/CRC, 2014.
6. Understanding Machine Learning: From Theory to Algorithms by Shalev-Shwartz, Shai Ben-David, 3rd Edition, Cambridge University Press, 2015.
7. Pattern classification by Richard O. Duda, Peter E. Hart, David G. Stork. Wiley, New York, 2001.

SYLLABUS OF SEMESTER VI B.E. (ELECTRONICS DESIGN TECHNOLOGY)

COURSE CODE: EDT399-1 (Open Elective-3) COURSE NAME: MICROCONTROLLER BASED DESIGN

L: 03Hrs, T: 00 Hr., Per week TOTAL CREDITS: 3

Course Outcomes:

Upon the completion of this course, students will able to:

1. Understand the microcontroller based development platform and its programming
2. Apply the knowledge, techniques and skill to integrate hardware and software with microcontroller based development platform.
3. Understand various communication protocols to interface microcontroller based system to real world.

Syllabus:

UNIT1: Introduction to Beagle Bone platform (4 Hrs.)

Introduction to BeagleBoard hardware platform, Memory organization, Study of on-chip peripherals.

UNIT II: Introduction to BeagleBone software (8 Hrs.)

Introduction to Embedded Linux, Integrated Development Environment (IDE) and basics of programming.

UNIT III: Interfacing to the BeagleBone Input/Outputs (8 Hrs.)

Interfacing of LED, SSD, Alphanumeric and Graphical LCD Display, switches, 4x4 key matrix etc.
Interfacing of electromagnetic Relay, controlling Electrical appliances with electromagnetic relays power semiconductor switches. Interfacing of DC, Servo, Stepper, Motors etc.

UNIT IV: Interfacing BeagleBone with the Physical Environment (6 Hrs.)

Interfacing of various Sensors with BeagleBone, Installation and configuration of Beagle Board as a Sensor Web Server for data acquisition.

UNIT V: Study of Beagle Board Buses (7 Hrs.)

Introduction to bus communication protocol: UART, I2C, SPI, CAN, etc.

UNIT VI: Advanced BeagleBone Systems (7 Hrs.)

The Internet of Things (IoT) with BeagleBone, Introduction to Images, Video, and Audio processing. Introduction to Embedded Kernel Programming.

TEXT BOOKS:

1. Derek Molloy, Exploring BeagleBone: Tools and Techniques for Building with Embedded Linux, Published by John Wiley & Sons, Inc., Second edition, 2019.

REFERENCE BOOKS:

1. Rui Santos and Luís Perestrelo, BeagleBone for Dummies, Published by: John Wiley & Sons, Inc., 2015.
2. Mark A. Yoder and Jason Kridner, BeagleBone Cook book, Published by O'Reilly Media, Inc., 2015.