Jawaharlal Nehru Technological University Anantapur

(Established by Govt. of A.P., Act. No. 30 of 2008)

Ananthapuramu–515 002 (A.P) India

III & IV Year B.Tech

Course Structures and Syllabi under R19 Regulations

JNTUA Curriculum
Electrical & Electronics Engineering B. Tech Course Structure

III & IV Year Course Structure and Syllabus

S.No	Course No	Course Name	Category	L-T-P	Credits
Semester - 5 (Theory - 6, Lab - 3)				
1.	19A02501T	AC Machines	PCC	2-1-0	3
2.	19A02502	Control Systems	PCC	2-1-0	3
3.	19A52601T	English Language Skills	PCC	3-0-0	3
4.	19A02504	Electrical Machine Design	PCC	1-1-0	2
5.	19A02503a 19A02503b 19A02503c 19A02503d	Professional Elective-I HVDC and FACTS DC Drives Programmable Logic Controllers Analog and digital IC applications Solar Power Systems	PEC-I	2-1-0	3
6.	19A01506a 19A01506b 19A02506a 19A03506a 19A03506b 19A04506a 19A04506b 19A05506a 19A05506b 19A27506a 19A27506b 19A54506a 19A52506a	Open Elective-I Experimental stress analysis. Building Technology Electrical Engineering Materials Introduction to Hybrid and Electric Vehicles Rapid Prototyping Analog Electronics Digital Electronics Free and Open Sources Systems Computer Graphics and Multimedia Animation Brewing Technology Computer Applications in Food Technology Optimization Techniques Technical Communication and Presentation Skills	OEC-I	2-1-0	3
7.	19A02501P	AC Machines Lab	PCC	0-0-3	1.5
8.	19A52601P	English Language Skills Lab	PCC	0-0-3	1.5
9.	19A02506	Power Electronics & Simulation Lab	PCC	0-0-2	1
10.	19A02507	Socially Relevant Project	PR	0-0-0.5	0.5
11.	19A99601	Research Methodology	MC	3-0-0	0
				Total	**21.5**

Semester - 6 (Theory - 6, Lab - 2)
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19A04301	Signals & Systems	PCC	2-1-0	3
2.	19A02601T	Digital Computer Platforms	PCC	2-1-0	3
3.	19A02602	Power System Analysis	PCC	2-1-0	3
4.		Professional Elective-II	PEC-II	2-1-0	3
	19A02603a	Electrical Distribution system Automation			
	19A02603b	AC Drives			
	19A02603c	Advanced Control systems			
	19A04703c	Embedded Systems			
	19A02603d	Wind Energy Systems			
5.		Open Elective-II	OEC-II	2-1-0	3
	19A01604a	Industrial waste and waste water management.			
	19A01604b	Building Services & Maintenance			
	19A02604a	Industrial Automation			
	19A02604b	System Reliability Concepts			
	19A03604a	Introduction to Mechatronics			
	19A03604b	Optimization techniques through MATLAB			
	19A04604a	Basics of VLSI			
	19A04604b	Principles of Communication Systems			
	19A05604a	Fundamentals of VR/AR/MR			
	19A05604b	Data Science			
	19A27604a	Food Toxicology			
	19A27604b	Food Plant Equipment Design			
	19A54604a	Wavelet Transforms & its applications			
	19A52604a	Soft Skills			
6.		Humanities Elective-I	HSMC	3-0-0	3
	19A52602a	Entrepreneurship & Incubation			
	19A52602b	Managerial Economics And Financial Analysis			
	19A52602c	Business Ethics And Corporate Governance			
	19A52602d	Enterprise Resource Planning			
	19A52602e	Supply Chain Management			
7.	19A02605	Control Systems & Simulation Lab	PCC	0-0-3	1.5
8.	19A02601P	Digital Computer Platforms Lab	PCC	0-0-3	1.5
9.	19A02606	Socially Relevant Project	PR	0-0-0.5	0.5
10.	19A99501	Constitution of India	MC	3-0-0	0
				Total	**21.5**

S.No	Course No	Course Name	Category	L-T-P	Credits
		Semester – 7 (Theory - 5, Labs -2 & Project – 1)			
1.	19A02701	Measurements & Sensors	PCC	2-1-0	3
2.	19A02702	Power System Protection	PCC	2-1-0	3
3.	19A02703a 19A02703b 19A02703c 19A04602T 19A02703d	Professional Elective-III Power System Operation & Control Switched mode Power Converters Instrumentation Digital Signal Processing Applications of Power Electronics to Renewable Energy Sources	PEC-III	3-0-0	3
4.	19A01704a 19A01704b 19A02704a 19A02704b 19A03704a 19A03704b 19A04704a 19A04704b 19A05704a 19A05704b 19A27704a 19A27704b 19A54704a	Open Elective-III Air pollution and control. Basics of civil Engineering Renewable Energy Systems Electric Vehicle Engineering Finite element methods Product Marketing Introduction to Microcontrollers & Applications Principles of Digital Signal Processing Fundamentals of Game Development Cyber Security Corporate Governance in Food Industries Process Technology for Convenience & RTE Foods Numerical Methods for Engineers (ECE , CSE, IT &CE)	OEC-III	3-0-0	3
5.	19A52701a 19A52701b 19A52701c 19A52701d 19A52701e	Humanities Elective-II Organizational Behavior Management Science Business Environment Strategic Management E-Business	HSMC	3-0-0	3
6.	19A02705	Power Systems & Simulation Lab	PCC	0-0-3	1.5
7.	19A02706	Measurements Lab	PCC	0-0-3	1.5
8.	19A02707	Project	PR	------	2
9.	19A02708	Industrial Training/Skill Development/Research Project*	PR	------	1.5
				Total	**21.5**

Semester – 8 (Theory - 2, Project – 1)						

S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A02801a 19A02801b 19A02801c 19A04604b 19A02801d	Professional Elective-IV Power Quality FPGA based controller design Intelligent Control Techniques Principles of Communication Systems Energy Storage Systems	PE	3-0-0	3
2.	19A01802a 19A01802b 19A02802a 19A02802b 19A03802a 19A03802b 19A04802a 19A04802b 19A04802c 19A04802d 19A05802a 19A05802b 19A27802a 19A27802b 19A54802a	Open Elective-IV Disaster Management. Global Warming and climate changes IoT Applications in Electrical Engineering Smart Electric Grid Energy conservation and management Non destructive testing Introduction to Image Processing Principles of Cellular and Mobile Communications Industrial Electronics Electronic Instrumentation Block Chain Technology and Applications MEAN Stack Technology Food Plants Utilities & Services Nutraceuticals & Functional Foods Mathematical Modeling & Simulation	OE	3-0-0	3
3.	19A02803	Project	PR	------	7
				Total	**13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ELECTRICAL & ELECTRONICS ENGINEERING
*****
<u>**Socially Relevant Projects**</u>

1. Energy Auditing

2. Solar Water Pumping Systems

3. Automatic Traffic Light Control Systems

4. Building Electrical Safety Measures

5. Electrical Protection Systems in Agricultural Fields

Minor Degree in Electrical Engineering

S.No.	Course No.	Course Name	Category	L-T-P	Credits
1.		Basic Electric Circuit Concepts	PCC	2-1-0	3
2.		Fundamentals of Electrical Machines	PCC	2-1-0	3
3.		Basic Components of Power System	PCC	2-1-0	3
4.		Basic Power Electronic Devices	PCC	2-1-0	3
5.		Basic Electrical Measurements and Control Systems	PCC	2-1-0	3
6.		Circuits & Machine Lab	PCC	0-0-3	1.5
7.		Electrical Measurements and Controls Lab	PCC	0-0-3	1.5
8.		Project	PR	------	2
				Total	**20**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)–III-I Sem

L T P C
2 1 0 3

(19A02501T) AC MACHINES

Course Objectives:

The students will be able to:
- Understand the fundamentals of AC machines, know equivalent circuit performance characteristics.
- Understand the methods of starting of Induction motors.
- Understand the methods of starting of Synchronous motors.
- Understand the parallel operation of Alternators.

UNIT-I

Fundamentals of AC machine windings

Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single-turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, Air-gap MMF distribution with fixed current through winding - concentrated and distributed, Sinusoidally distributed winding, winding distribution factors.

Learning Outcomes:

By the end of the unit, student will be able to:
- Understand the fundamentals of various parts used, different types of windings, distribution factor, air gap mmf distribution, constant and pulsating magnetic fields, addition of pulsating magnetic fields and revolving magnetic field.
- Analyze Magnetic and pulsating fields produced by spatially displaced windings and when the windings are spatially shifted by an angle.
- Apply above concepts to solve numerical problems.

UNIT-II

Induction Machines

Operating principle, Construction, Types (squirrel cage and slip-ring), Starting and Maximum Torque, Equivalent circuit, Phasor Diagram, Torque-Slip Characteristics, power flow in induction machines, Losses and Efficiency, No load and blocked rotor test, Circle diagram-performance characteristics, Numerical problems. Methods of starting, braking and speed control for induction motors, Doubly-Fed Induction Machines, crawling and cogging.

Learning Outcomes:

By the end of the unit, student will be able to:
- Understand the construction, types, equivalent circuit, torque slip characteristics and various losses present in an induction machine.
- Analyze the phasor diagram, efficiency, starting and maximum torque, effect of parameter variation on torque speed characteristics
- Apply above concepts to solve numerical problems.

UNIT-III

Single-phase induction motors

Constructional features, double revolving field theory, equivalent circuit, determination of parameters. Split-phase starting methods and its applications, capacitor start and run single phase motors, reluctance single phase motors, stepper motors, BLDC motors.

Learning Outcomes:

By the end of the unit, student will be able to:
- Understand induction generator operation, self-excitation, doubly fed induction machines, various methods of starting, braking and speed control of induction motors.
- Understand the constructional features, principle involved, equivalent circuit of single-phase induction motor and various starting methods and its applications.
- Apply above concepts to solve numerical problems.

UNIT-IV

Synchronous generators

Constructional features, cylindrical rotor synchronous machine - generated EMF, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation-EMF, MMF, ZPF and ASA methods. Operating characteristics of synchronous machines, Salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics. Parallel operation of alternators - synchronization and load division.

Learning Outcomes:

By the end of the unit, student will be able to:
- Understand the constructional features, emf generated, equivalent circuit, armature reaction, voltage regulation, characteristics, two reaction theory of synchronous machine.
- Analyze the phasor diagrams, parallel operation of alternators, synchronization and load division of synchronous generators.

- Apply above concepts to solve numerical problems.

UNIT-V

Synchronous motors

Principle of operation, methods of starting, Phasor diagram of synchronous motor, variation of current and power factor with excitation, Predetermination of V and inverted V curves, Hunting and use of damper bars, Synchronous condenser and power factor correction, Excitation and power circles.

Learning Outcomes:

By the end of the unit, student will be able to:
- Understand the principle of operation, methods of starting, concept of hunting, synchronous condenser and power factor correction of synchronous motors.
- Analyze the phasor diagram, determination of V and inverted V curves and power circles of synchronous motor.
- Apply above concepts to solve numerical problems.

Course Outcomes:

At the end of this course, students will be able to:
- Understand the basics of ac machine windings, construction, principle of working, equivalent circuit of induction and synchronous machines.
- Analyze the phasor diagrams of induction and synchronous machine, parallel operation of alternators, synchronization and load division of synchronous generators.
- Apply the concepts to determine V and inverted V curves and power circles of synchronous motor.
- Analyze the various methods of starting in both induction and synchronous machines.

Text Books:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

References:

1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
3. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
4. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)–III-I Sem
        L   T   P   C
        2   1   0   3

(19A02502) CONTROL SYSTEMS

Course Objectives:

To make the students learn about:
- Merits and demerits of open loop and closed loop systems; the effect of feedback
- The use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response, time domain specifications and the concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modelling of Control system

UNIT – I

CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

Learning Outcomes:

At the end of the unit, the student will be able to
- Write the differential equations for mechanical and electrical systems
- Obtain the transfer function from block diagrams, servo motors and signal flow graphs

UNIT-II

TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

Learning Outcomes:

At the end of the unit, the student will be able to
- Analyze the time domain specifications
- Calculate the steady state errors
- Understand about Proportional, Integral and Derivative controllers along with combinations

UNIT– III

STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

Learning Outcomes:

At the end of the unit, the student will be able to
- Analyze the concept of stability in time domain
- Apply the concept of Routh's stability and Root locus in time domain

UNIT– IV

FREQUENCY RESPONSE ANALYSIS

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

Learning Outcomes:

At the end of the unit, the student will be able to
- Evaluate the frequency domain specifications from Bode, Polar and Nyquist plots
- Design Compensators for various systems
- Deducing transfer functions from Bode Plots
- Understand difference between Phase and Gain margins

UNIT– V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability.

Learning Outcomes:

At the end of the unit, the student will be able to
- Understand the concept of state space, controllability and observability
- Obtain the transfer function from sate space and vice versa
- Understand the state transition method of solving time invariant state equations

Course Outcomes:

After completing the course, the student should be able to:
- Understand the concepts of control systems classification, feedback effect, mathematical modelling, time response and frequency response characteristics, state space analysis
- Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and demonstrate the use of these techniques.
- Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
- Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.

TEXT BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice Hall of India Pvt. Ltd., 2010.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering" 5th edition, New Age International (P) Limited Publishers, 2007.

REFERENCE BOOKS:

1. M. Gopal, "Control Systems Principles & Design" 4th Edition, Mc Graw Hill Education, 2012.
2. B. C. Kuo and Farid Golnaraghi, "Automatic Control Systems" 8th edition, John wiley and sons, 2003.
3. Joseph J Distefano III, "Feedback and Control Systems", Allen R Stubberud & Ivan J Williams, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Graham C. Goodwin, "Control System Design" Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Gene F. Franklin, "Feedback Control of Dynamic Systems", J.D. Powell and Abbas Emami- Naeini, 6th Edition, Pearson, 2010.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (ECE)– III-I Sem

L T P C
3 0 0 3

(19A52601T) ENGLISH LANGUAGE SKILLS

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language skills in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. They should be able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives

- Facilitate active listening to enable inferential learning through expert lectures and talks
- Impart critical reading strategies for comprehension of complex texts
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids
- Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence
- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing

UNIT -I

Text:

1. **Lines Composed a Few Miles above Tintern Abbey - William Wordsworth**
2. **The Lotos-Eaters - Alfred Tennyson**

Listening: Listening to famous speeches for structure and style

Speaking: Oral presentations on general topics of interest.

Reading: Reading for meaning and pleasure – reading between the lines.

Writing: Appreciating and analyzing a poem –Paraphrasing, note-taking.

Grammar and Vocabulary: Tenses (Advanced Level) Correcting errors in punctuation -Word roots and affixes.

Learning Outcomes

At the end of the module, the learners will be able to

- Understand the purpose of rhythm and rhyme and the use of figures of speech in making the presentation lively and attractive
- Apply the knowledge of structure and style in a presentation, identify the audience and make note of key points
- Make formal structured presentations on general topics using grammatical understanding
- Prioritize information from reading texts after selecting relevant and useful points
- Paraphrase short academic texts using suitable strategies and conventions

UNIT -II

Text: The Model Millionaire – Oscar Wilde

Listening: Following the development of theme; answering questions on key concepts after listening to stories online.
Speaking: Narrating personal experiences and opinions.
Reading: Reading for summarizing and paraphrasing; recognizing the difference between facts and opinions.
Writing: Summarizing, précis writing, letter and note-making
Grammar and Vocabulary: Subject-verb agreement, noun-pronoun agreement, collocations.

Learning Outcomes

At the end of the module, the learners will be able to

- Comprehend academic lectures, take notes and answer questions
- Make formal structured presentations on academic topics
- Distinguish facts from opinions while reading
- Summarize and make a précis of reports
- Use correct english avoiding common errors in formal speech and writing

UNIT – III

Text: Speech at IIM Calcutta – AzimPremji
Listening: Identifying views and opinions expressed by different speakers while listening to speeches.
Speaking: Small talks on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.
Reading: Identifying claims, evidences, views, opinions and stance/position.
Writing: Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences.
Grammar and Vocabulary: The use of Active and passive Voice, vocabulary for academic texts

Learning Outcomes

At the end of the module, the learners will be able to
  * Critically follow and participate in a discussion
  * participate in group discussions using appropriate conventions and language strategies
  * comprehend complex texts and identify the author's purpose
  * produce logically coherent argumentative essays
  * use appropriate vocabulary to express ideas and opinions

UNIT – IV

Text: A Biography of Steve Jobs
Listening: Listening to identify important moments - Understanding inferences; processing of information using specific context clues from the audio.
Speaking: Group discussion; reaching consensus in group work (academic context).
Reading: Reading for inferential comprehension.
Writing: Applying for internship/ job **-** Writing one's CV/Resume and cover letter.
Grammar and Vocabulary: Phrasal verbs, phrasal prepositions and technical vocabulary.

Learning Outcomes

At the end of the module, the learners will be able to
  * Draw inferences and conclusions using prior knowledge and verbal cues
  * Express thoughts and ideas with acceptable accuracy and fluency
  * Develop advanced reading skills for deeper understanding of texts
  * Prepare a cv and write a cover letter to seek internship/ job
  * Understand the use of technical vocabulary in academic writing

Unit –V
Text: How I Became a Public Speaker - George Bernard Shaw

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.
Speaking: Formal team presentations on academic/ general topics.
Reading: Intensive and extensive reading.
Writing: Structure and contents of a Report – Abstract – Project report features.
Grammar and Vocabulary: Correcting common errors, improving vocabulary and avoiding clichés and jargons.

Learning Outcomes

At the end of the module, the learners will be able to
- Develop advanced listening skills for in-depth understanding of academic texts
- Collaborate with a partner to make effective presentations
- Understand and apply the structure of project reports
- Demonstrate ability to use grammatically correct structures and a wide range of vocabulary

Course Outcomes

At the end of the course, the learners will be able to
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

Text Book

- "Forging Ahead": A Course Book for B.Tech Students. Orient BlackSwan, 2020.

Reference Books

1) Bailey, Stephen. "Academic writing: A handbook for international students". Routledge, 2014.
2) Chase, Becky Tarver. Pathways: Listening, "Speaking and Critical Thinking". Heinley ELT; 2nd Edition, 2018.
3) Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4) Hewings, Martin. "Cambridge Academic English" (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE) –III-I Sem   **L   T   P   C**
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(19A02504) ELECTRICAL MACHINE DESIGN

Course Objectives:

The student will be able to:
- Know about various principles of design factors, ratings based on heating and cooling of electrical machines
- Know about designing of DC machines along with windings
- Understand about overall designing of 1-ϕ transformer
- Be able to know about designing of Induction machine along with winding configurations
- Able to know about designing of Synchronous machines

UNIT-I:

DESIGN FACTORS, HEATING AND COOLING

Learning Outcomes

At the end of the module, the learners will be able to
- To know about fundamental aspects of design parameters and limitations in designing
- To know about heating and cooling phenomenon in selection of machine rating and types of ratings
- To know the design aspects of continuous and short time ratings of machines
- To know the design aspects of machine for variable loads

UNIT-II:

DESIGN OF DC MACHINES

Output equation and main dimensions, choice of flux density, choice of ampere-conductors, Selection of number of poles, Length of air gap, Design of field winding, Simplex Lap and Wave windings-Numerical examples.

Learning Outcomes

At the end of the module, the learners will be able to
- To know about designing aspects of DC machines with respect to performance equations and characteristics
- To understand necessity of air gap and its length requirement between armature and field

- To know about classification of field windings and design of them
- To understand about complete design aspects of DC machines
- To be able to design DC machine based on the specified ratings

UNIT-III:

DESIGN OF SINGLE PHASE TRANSFORMERS

Output of transformer, Design of core, Selection of type of winding, Design of insulation, Overall design, No-load current estimation, Design of tank with tubes-Numerical examples.

Learning Outcomes

At the end of the module, the learners will be able to
- To know about the design aspects of 1-ϕ transformer based on performance equations
- To understand about the design aspects based on core, type of winding
- To know about design of tanks in 1-ϕ transformers
- To know about design aspects of insulations in transformers
- To understand complete design aspects of 1-ϕ transformers and to be able to design for specified rating

UNIT-IV:

DESIGN OF INDUCTION MACHINES
Three phase Induction machine output equation and main dimensions, Selection of stator and rotor slots, Length of air gap, and Reduction of harmonic torques, Hemitropic, whole coil and Mush windings-Numerical examples.

Learning Outcomes

At the end of the module, the learners will be able to
- To know about the design aspects of three phase induction machines based on performance equations
- To know about selection of stator and rotor slots, air gap
- To know about necessity mitigating harmonic torque
- To know about various winding designs of induction machines and to distinguish between squirrel cage & slip ring machines
- To understand complete aspects of 3-ϕ induction machine and to be able to design for a specified rating

UNIT-V:

DESIGN OF SYNCHRONOUS MACHINES
Output equation, Main dimensions for cylindrical and salient pole machines, Choice of specific magnetic and electric loadings, Effect of SCR on machine performance, Length of air gap, Selection of stator slots, and mitigation of harmonics-Numerical examples.

Learning Outcomes

At the end of the module, the learners will be able to
- To know about the design aspects of synchronous machines based on performance equations
- To distinguish between cylindrical and salient pole machines
- To design synchronous machine based on shunt circuit ratio calculations
- To know about the specific electric and magnetic loads and their choice
- To understand complete design aspects of 3-ϕ synchronous machine and to be able to design for a specified rating

Course Outcomes:

The student will be able to:
- Understand various design factors, types of windings, choice of machine, selection and ratings
- Able to design DC machine based on specified rating
- Able to design 1-ϕ transformer based on specified rating
- Able to design 3-ϕ Induction machine based on specified rating
- Able to design 3-ϕ Synchronous machine based on specified rating

Text books:
1. A.K. Sawhney and Chakrabarti, "A course on Electrical Machine Design", 6th edition, Dhanpat Rai & Co Pvt. Ltd., 2014.
2. K. G. Upadhyay, "Design of Electrical Machines", 1st Edition, New Age International Pvt. Ltd., 2018.

Reference books:
1. M G Say, "The performance and Design of Alternating Current Machines", 3rd edition, CBS Publishers & Distributors, New Delhi, 2002.
2. A. E. Clayton and N N Hancock, "Performance and Design of Direct Current Machines", 3rd edition, CBS Publication, 2004.

3. V. N. Mittle and Aravind Mittal, "Design of Electrical Machines", Standard Publishers Distributions, 2009.
4. R. K. Agarwal, "Principles of Electrical Machine Design", S.K. Kataria & Sons, 2010.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)–III-I Sem

L T P C
3 0 0 3

(19A02503a)   HVDC AND FACTS
PROFESSIONAL ELECTIVE-I

Course Objectives:

To get the student exposed to:
- High voltage DC transmission systems
- Flexible AC transmission systems
- Various configurations of the above, Principle of operation, Characteristics of various FACTS devices

UNIT-I:

INTRODUCTION

Electrical Transmission Networks, Conventional Control Mechanisms-Automatic Generation Control, Excitation Control, Transformer Tap-Changer Control, Phase-Shifting Transformers; Advances in Power-Electronic Switching Devices, Principles and Applications of Semiconductor Switches; Limitations of Conventional Transmission Systems, Emerging Transmission Networks, HVDC and FACTS.

Learning Outcomes

At the end of the module, the learners will be able to
- Know about difference between HVDC and FACTS
- Know about limitations of conventional transmission systems
- Know about recent developments in Power Electronic switching devices

UNIT – II:

HIGH VOLTAGE DC TRANSMISSION – I

Types of HVDC links - Monopolar, Homopolar, Bipolar and Back-to-Back, Advantages and disadvantages of HVDC Transmission, Analysis of Greatz circuit, Analysis of bridge circuit without overlap, Analysis of bridge with overlap less than 60^0, Rectifier and inverter characteristics, complete characteristics of rectifier and inverter, Equivalent circuit of HVDC Link.

Learning Outcomes

At the end of the module, the learners will be able to
- To learn about various HVDC link configurations
- To develop equivalent circuit of HVDC link

UNIT – III:

HIGH VOLTAGE DC TRANSMISSION – II

Desired features and means of control, control of the direct current transmission link, Constant current control, Constant ignition angle control, Constant extinction angle control, Converter firing-angle control-IPC and EPC, frequency control and Tap changer control, Starting, Stopping and Reversal of power flow in HVDC links.

Learning Outcomes

At the end of the module, the learners will be able to
- To learn about various DC link control techniques
- To learn about starting, stopping and reversal of power flow in DC links

UNIT-IV:

FLEXIBLE AC TRANSMISSION SYSTEMS-I

Types of FACTS Controllers, brief description about various types of FACTS controllers, Operation of 6-pulse converter, Transformer Connections for 12-pulse, 24-pulse and 48-pulse operation, principle of operation of various types of Controllable shunt Var Generation, Principle of switching converter type shunt compensator, principles of operation of various types of Controllable Series Var Generation, Principle of Switching Converter type series compensator.

Learning Outcomes

At the end of the module, the learners will be able to
- To understand principle of working and differences between various pulse configurations of various converters
- To understand the necessity of compensators
- To analyze the configurations of shunt, VAR, series configurations, etc.

UNIT-V:

FLEXIBLE AC TRANSMISSION SYSTEMS-II
Unified Power Flow Controller (UPFC) – Principle of operation, Transmission Control Capabilities, Independent Real and Reactive Power Flow Control; Interline Power Flow

Controller (IPFC) – Principle of operation and Characteristics, UPFC and IPFC control structures (only block diagram description), objectives and approaches of voltage and phase angle regulators

Learning Outcomes

At the end of the module, the learners will be able to
- To know more about advanced Power flow controllers
- To analyze the transmission control strategies
- To know about voltage and phase regulators

Course Outcomes:

The student will be able to understand:
- The necessity of HVDC systems as emerging transmission networks
- Power Electronic devices to understand the necessity of reactive power compensation devices
- To obtain equivalent circuits of various HVDC system configurations

Text Books:

1. Narain G. Hingorani and Laszlo Gyugyi, "Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems", IEEE Press, Wiley-Interscience, New Jersey, 2000.
2. E.W. Kimbark, "Direct current transmission, Vol. I", Wiley Inter science, New York, 1971.

Reference Books:

1. K R Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International Publishers, New Delhi, 2007.
2. Anrique Acha, Claudio R. Fuerte-Esquivel, Hugo Ambriz-Pérez and César Angeles-Camacho, "FACTS: Modelling and Simulation in Power Networks", John Wiley & Sons, West Sussex, 2004.
3. R Mohan Mathur and Rajiv K Varma, Thyristor-"Based FACTS Controllers for Electrical Transmission Systems", IEEE Press, Wiley-Interscience, New Jersey, 2002.

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B.Tech (EEE) –III-I Sem

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(19A02503b)   DC Drives
(PROFESSIONAL ELECTIVE-I)

Course Objectives:

- To understand the basic concepts of DC Motor fundamentals and mechanical systems.
- To understand the concept of converter control
- To design various chopper control techniques.
- To understand the concept of closed loop control of DC Drives
- To design digital control of DC Drives.

UNIT-I:

DC MOTORS FUNDAMENTALS AND MECHANICAL SYSTEMS: Introduction to high speed drives and modern drives. Characteristics of mechanical system – dynamic equations, components of torque, types of load;

Learning Outcomes

At the end of the module, the learners will be able to
- To understand the basic concepts of high speed drives
- To understand the basic concepts of modern drives
- To understand the basic concepts of mechanical systems
- To understand the basic concepts of types of loads and characteristics

UNIT-II:

CONVERTER CONTROL: Principle of phase control – Fundamental relations; Analysis of series and separately excited DC motor with single-phase and three-phase converters – waveforms performance parameters, performance characteristics. Continuous and discontinuous armature current operations; Current ripple and its effect on performance; Operation with freewheeling diode; Implementation of braking schemes; Drive employing dual converter.

Learning Outcomes

At the end of the module, the learners will be able to
- Understand the concept of phase control of separately excited DC motor.
- Understand the concept of breaking mechanisms of DC motor.
- Understand the performance characteristics of 1-phase and 3-phase converters
- To distinguish between various modes of operation

UNIT-III:

CHOPPER CONTROL: Introduction to time ratio control and frequency modulation; Class A,B, C, D and E chopper controlled DC motor – performance analysis, multi-quadrant control – Chopper based implementation of braking schemes; Multi-phase chopper; Related problems.

Learning Outcomes

At the end of the module, the learners will be able to
- Understand the concept of Chopper Control
- Design of Chopper.

UNIT-IV:

CLOSED LOOP CONTROL: Modelling of drive elements – Equivalent circuit, transfer function of self, separately excited DC motors; Linear Transfer function model of power converters; Sensing and feedback elements - Closed loop speed control – current and speed loops, P, PI and PID controllers – response comparison. Simulation of converter and chopper fed DC drive.

Learning Outcomes

At the end of the module, the learners will be able to
- Understand Equivalent circuit, transfer function of self, separately excited DC motor.
- Designing of current and speed loops, P, PI and PID controllers.

UNIT-V:

DIGITAL CONTROL OF D.C DRIVE: Phase Locked Loop and micro-computer control of DC drives – Program flow chart for constant horse power and load disturbed operations; Speed detection and gate firing.

Learning Outcomes

At the end of the module, the learners will be able to
- Understand the concept of PLL and micro controlled DC drives.
- Design of Speed detection and gate firing.

Course Outcomes:

- Understand the basics of high speed DC Motor Drives.
- Understand the various characteristics of mechanical systems
- To analyze different modes of operation of converters and control strategies
- To understand basics of Chopper control and analysis
- To know about closed loop and digital control strategies of DC drives

TEXT BOOKS
1. Gopal K Dubey, "Power Semiconductor controlled Drives", Prentice Hall Inc., New Jersey, 1989.
2. R. Krishnan, "Electric Motor Drives – Modeling, Analysis and Control", Prentice-Hall of India Pvt. Ltd., New Delhi, 2003.

REFERENCES
1. Gobal K. Dubey, "Fundamentals of Electrical Drives", Narosal Publishing House, New Delhi, 2001.
2. Bimal K. Bose, "Modern Power Electronics and AC Drives", Pearson Education Pvt. Ltd., New Delhi, 2003.
3. Vedam Subramanyam, "Electric Drives – Concepts and Applications", Tata McGraw-Hill publishing company Ltd., New Delhi, 2002.
4. P.C Sen, "Thyristor DC Drives", John wiely and sons, New York, 1981
5. By M. D. Singh and K.B. Khanchandani, "Power Electronics" 2nd Edition, Tata Mc Graw Hill, 2008.

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(19A02503c)   PROGRAMMABLE LOGIC CONTROLLERS PROFESSIONAL ELECTIVE-I

Course Objectives:

The student will be able to:
- Understand the basic functions and types of PLCs
- Get exposure of Easy Veep software, its applications
- Classification of PLCs and applications
- Programming using PLCs
- Troubleshooting aspects using PLCs

UNIT-I

Introduction:

Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen-Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

Learning Outcomes

At the end of the module, the learners will be able to
- To understand about basic functions of PLCs
- To know about classification of PLCs
- To distinguish between PLCs and Mechanical relays
- To know about Processor and I/O cards

UNIT-II

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

Learning Outcomes

At the end of the module, the learners will be able to
- To know about Easy Veep software
- To know about Logic diagrams
- To understand about Search engine
- To know about interfacing of PC and PLCs

UNIT-III

PLC software and applications, Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

Allen Bradley PLC: Introduction to Rockwell Software, Hardware focus, Hardware considerations (Field wiring, Master Control Relay, VFD), Basic programming and applications, Cascade control – subroutine, Different programs.

Learning Outcomes

At the end of the module, the learners will be able to
- To know about basic features of PLCs
- To know about various instructions of PLC
- To know about various PLC versions
- To understand about Cascade control and subroutines

UNIT-IV

Programming instructions: Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions - Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring

Learning Outcomes

At the end of the module, the learners will be able to
- To know about various Programming instructions
- To understand Math instructions in PLCs
- To know about Logical instructions
- To understand about Communications with PLC using set up and monitoring

UNIT-V

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO_2), plastic wrapping machines etc.

Learning Outcomes

At the end of the module, the learners will be able to
- To know about analog and digital parameters in certain PLCs
- To apply PLCs for control system stability aspects
- To know about troubleshooting techniques
- To identify few applications of PLCs in Science and Technology fields

Course Outcomes:

At the end of the course, the student will be able to:
- Understand different types of PLCs
- Understand the usage of Easy Veep software
- Understand the hardware details of Allen Bradley PLC
- Programming of PLCs
- Know about few applications of PLCs in different fields of Science and Technology

Text Books:

1. Hugh Jack, "Automating manufacturing systems" with PLCs 2010.
2. PLC Hand Book (Automationdirect Siemens)

References:

1. R. Bliesener, "Programmable Logic Controllers", F Ebel, Festo. Didactic publishers, 2002.
2. W. Bolton, "Programmable Logic Controllers", 4th Edition, Newnes, 2006.
3. by Jay F. Hooper, "Introduction to PLCs", 2nd Edition, Carolina Academic Press, 2006.

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(19A02503d) SOLAR POWER SYSTEMS
PROFESSIONAL ELECTIVE-I

Course Objectives:
- To understand about solar cells and solar radiation energy
- To understand classification of modules and arrays of solar cells for different ratings
- To understand about charge controllers and Maximum Power Point Tracking
- To understand design and integration aspects of solar power systems
- To know about off grid, grid connections and their components in solar power systems

UNIT-I:

SOLAR CELLS

Advantages and challenges for solar PV energy conversion, parameters of Solar Cells, factors effecting generation through solar cells, solar thermal energy, solar radiation energy

Learning Outcomes

At the end of the module, the learners will be able to
- To understand the advantages of solar cells as compared to conventional batteries
- To know about parameters of solar cells
- To know about factors effecting electricity generation
- To know about solar thermal energy
- To know about solar radiation energy

UNIT-II:

SOLAR PV MODULES AND ARRAYS

PV modules - ratings, standard parameters, factors effecting electricity generated by PV module, measuring module parameters
PV module arrays – series connection, estimating number of cells, mismatch in voltage and current, parallel connection, power generated, ratings, estimating number of modules, series and parallel connections, power generated, estimating number of modules

Learning Outcomes

At the end of the module, the learners will be able to
- To be able to distinguish between modules and arrays of solar cells
- To know about various advantages of series connections of modules and arrays
- To know about various advantages of parallel connections of modules and arrays

- To know about ratings of solar cells for various configurations
- To know about estimating of number of cells for various configurations and different ratings

UNIT-III:

CHARGE CONTROLLERS AND MPPT

Charge Controllers - Basic function, working principle, types, features, specifications, Maximum Power Point Tracking – need for MPPT, MPPT charge controller, specifications, methods of MPPT

Learning Outcomes

At the end of the module, the learners will be able to
- To understand the concept of charge controller, their features and specifications requirement
- To understand basic types of charge controllers
- To understand about MPPT which is a key feature of solar power extraction
- To know about MPPT charge controller and methods
- Specifications of MPPT charge controller

UNIT-IV:

GRID CONNECTED SOLAR POWER SYSTEMS

Grid connections to small and large power applications, configurations with and without battery backup, captive power system, grid support components, array combiner box, DC and AC cabling, DC and AC distribution boxes

Unit Outcomes:

- To distinguish between grid connections for small and large power applications
- To distinguish between various configurations with and without battery backup
- To distinguish between captive and grid support power system
- To know about various components of grid connected solar power system
- To distinguish between DC and AC cabling requirements in solar power systems

UNIT-V:

SOLAR PV SYSTEM DESIGN AND INTEGRATION

Types – standalone, grid connected and hybrid SPV systems, design methodologies, standalone system, design chart, look up tables, examples

Learning Outcomes

At the end of the module, the learners will be able to
- To understand about design aspects of solar PV system
- To distinguish between design chart and look up tables
- To understand about standalone systems
- To distinguish between standalone systems and hybrid configurations
- To be able to design a solar PV system to specified rating

Course Outcomes:

- To distinguish between solar cells, modules, arrays and the factors effecting in designing
- To be able to estimate the number of solar cells, modules and array required for specified ratings
- To understand about charge controllers
- To understand about MPPT
- To be able to design overall solar power system
- To know about necessity integration of solar power systems with other such sources

Text Books:

1. Chetan Singh Solanki, "Solar Photovoltaic Technology and Systems": A Manual for Technicians, Trainers and Engineers PHI Learning Pvt. Ltd, 2013
2. Chetan Singh Solanki, "Solar Photovoltaics: Fundamentals, Technologies and Applications " 2nd Edition, PHI Learning Pvt. Ltd, 2011

References:

1. H.P. Garg, J. Prakash, "Solar Energy Fundamentals and Applications", Tata Mc Graw Hill, 1997
2. S. Rao and B.B. Parulekar, "Energy Technology", 4th Edition, Khanna Publishers, 2005

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(19A01506a) EXPERIMENTAL STRESS ANALYSIS
OPEN ELECTIVE-I

Course Objective:

To bring awareness on experimental method of finding the response of the structure to different types of load.

- Demonstrates principles of experimental approach.
- Teaches regarding the working principles of various strain gauges.
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete.
- Gives an insight into the principles of photo elasticity.

UNIT-I

PRINCIPLES OF EXPERIMENTAL APPROACH: - Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems.

Learning outcomes:
At the end of the unit, students will be able to:
- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

UNIT-II

STRAIN MEASUREMENT USING STRAIN GAUGES: - Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

UNIT-III

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:- Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduces various strain rosettes and corrections for strain gauges
- Gives an insight into the destructive and non destructive testing of concrete

UNIT-IV

THEORY OF PHOTOELASTICITY: - Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope.

UNIT-V

TWO DIMENSIONAL PHOTOELASTICITY: - Introduction – Iso-chromatic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials.

Course Outcomes:

After completion of the course
- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

TEXT BOOKS:-

1. J.W.Dally and W.F.Riley, "Experimental stress analysis College House Enterprises"
2. Dr.Sadhu Singh, "Experimental stress analysis", khanna Publishers

REFERENCE BOOKS:

1. U.C.Jindal, "Experimental Stress analysis", Pearson Publications.
2. L.S.Srinath, "Experimental Stress Analysis", MC.Graw Hill Company Publishers.

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(19A01506b)   BUILDING TECHNOLOGY
OPEN ELECTIVE-I

Course Objectives:

- To impart to know different types of buildings, principles and planning of the buildings.
- To identify the termite control measure in buildings, and importance of grouping circulation, lighting and ventilation aspects in buildings.
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of acoustics in planning and designing of buildings.

UNIT-I

Overview of the course, basic definitions, buildings-types-components- economy and design-principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

Learning outcomes:
At the end of the unit, students will be able to:
- To be able to plan the building with economy and according to functional requirement.

UNIT-II

Termite proofing: Inspection-control measures and precautions- lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while panning a building.

Learning outcomes:
At the end of the unit, students will be able to:
- Able to know the termite proofing technique to the building and protection form lightening effects.
- To be able to know the fire protection measure that are to be adopted while planning a building.

UNIT-III

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs- planning of stairs- other modes of vertical transportation – lifts-ramps-escalators.

Learning outcomes:
At the end of the unit, students will be able to:
- To be able to know the different modes of vertical transportation and their suitability

UNIT-IV

Prefabrication systems in residential buildings- walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

Learning outcomes:
At the end of the unit, students will be able to:
- Identify the adoption of prefabricated elements in the building.
- Know the effect of seismic forces on buildings

UNIT-V

Acoustics – effect of noise – properties of noise and its measurements, principles of acoustics of building. Sound insulation- importance and measures.

Learning outcomes:
At the end of the unit, students will be able to:
- To know the effect of noise, its measurement and its insulation in planning the buildings

Course Outcomes:
After completion of the course the student will be able to
- Understand the principles in planning and design the buildings.
- Know the different methods of termite proofing in buildings.
- Know the different methods of vertical transportation in buildings.
- Know the implementation of prefabricated units in buildings and effect of earthquake on buildings.
- Know the importance of acoustics in planning and designing of buildings.

TEXT BOOKS :

1. Varghese, "Building construction", PHI Learning Private Limited.
2. Punmia.B.C, "Building construction", Jain.A.K and Jain.A.K Laxmi Publications.
3. S.P.Arora and S.P.Brndra "Building construction", Dhanpat Rai and Sons Publications, New Delhi
4. "Building construction-Technical teachers training institute", Madras, Tata McGraw Hill.

REFERENCE BOOKS:

1. National Building Code of India, Bureau of Indian Standards

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(19A02506a) ELECTRICAL ENGINEERING MATERIALS
(OPEN ELECTIVE-I)

Course Objectives:

To make the students learn about
- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthing

UNIT-I Conducting Materials

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

Learning outcomes:
At the end of the unit, students will be able to:
- Uunderstand the classification of conducting materials.
- Analyze the properties of different conducting materials
- Apply the materials where it is applicable
- Know about electron configuration of atom

UNIT-II Dielectric and High Resistivity Materials

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of – solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

Learning outcomes:
At the end of the unit, students will be able to:
- Understand the classification of dielectric and high resistivity materials.
- Analyze the properties of dielectric and high resistivity materials
- Understand about concept of polarization and dipolar polarization
- Apply the materials where it is applicable

UNIT-III Solid Insulating Materials

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials - Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

Learning outcomes:
At the end of the unit, students will be able to:
- Understand about various characteristics of solid insulating materials
- Understand the classification of solid insulating materials.
- Analyze the properties of solid insulating materials
- Apply the materials where it is applicable

UNIT-IV Liquid & Gas Insulating Materials

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

Unit Outcomes:

At the end of the unit, the student will be able to
- Understand the classification of liquid insulating materials.
- Analyze the properties of liquid insulating materials
- Apply the materials where it is applicable
- Understand about properties and classification of gaseous insulators

UNIT-V Domestic Wiring

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring- Godown wiring – Basics of Earthing – single phase wiring layout for a residential building.

Learning Outcomes:
At the end of the unit, the student will be able to
- Understand about wiring materials and accessories
- Understand about earthing and wiring layout of domestic buildings
- Design and develop Residential wiring
- Know about godown wiring

Course Outcomes:

After completing the course, the student should be able to:
- Understand the classification of materials, domestic wiring materials and earthing.
- Analyze the properties of different electrical materials
- Apply where the materials are applicable based on properties of materials
- Design and develop Residential wiring, godown wiring and earthing.

Text Books:

1. G.K. Mithal, "Electrical Engineering Materials", Khanna publishers, 2nd edition, 1991.
2. R.K. Rajput, A course in "Electrical Engineering Materials", Laxmi publications, 2009.

Reference Books:

1. C.S. Indulkar and S. Thiruvengadam,   "An Introduction to Electrical Engineering Materials" S Chand & Company, 2008.
2. Technical Teachers Training Institute, "Electrical engineering Materials", 1st Edition, Madras, McGraw Hill Education, 2004.
3. by S.P. Seth, "A course in Electrical Engineering Materials Physics Properties & Applications", Dhanapat Rai & Sons Publications, 2018.

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(19A03506a) INTRODUCTION TO HYBRID AND ELECTRIC VEHICLES
OPEN ELECTIVE-I

Course Objectives:

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

UNIT I: Electric Vehicle Propulsion and Energy Sources

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Learning Outcomes:

After successful completion of this unit, the students will be able to
- Summaries the concepts of electrical vehicle propulsion and energy sources. (l2)
- Identify the types of power sources for electrical vehicles.(l3)
- Demonstrate the design considerations for propulsion system. (l2)
- Solve the problems on tractive power and energy required. (l3)

UNIT II: Electric Vehicle Power Plant And Drives

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives-PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Choose a suitable drive scheme for developing an electric vehicles depending on resources.(l1)
- List the various power electronic converters. (l1)
- Describe the working principle dc/dc converters and buck boost convertor. (l2)
- Explain about ac drives. (l2)

UNIT III: Hybrid And Electric Drive Trains

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Learning Outcomes:

After successful completion of this unit, the students will be able to
- Identify the social importance of hybrid vehicles. (l3)
- Discus impact of modern drive trains in energy supplies. (l6)
- Compare hybrid and electric drive trains.(l2)
- Analyze the power flow control and energy efficiency. (l6)

UNIT IV: Electric and Hybrid Vehicles - Case Studies

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles.

Learning Outcomes:

After successful completion of this unit, the students will be able to
- List the various electric and hybrid vehicles in the present market. (l1)
- Discus lightly hybridized vehicle and low voltage systems.(l6)
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. (l2)

UNIT V: Electric And Hybrid Vehicle Design :

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Learning Outcomes:

After successful completion of this unit, the students will be able to
- Illustrate matching the electric machine and the internal combustion engine. (l2)
- Select the energy storage technology. (l3)
- Select the size of propulsion motor. (l3)
- Design and develop basic schemes of electric and hybrid electric vehicles. (l3)

Course outcomes:

After learning the course the students will be able to:
- Explain the working of hybrid and electric vehicles. (l2)
- Choose a suitable drive scheme for developing an hybrid and electric vehicles depending on resources. (l3)
- Develop the electric propulsion unit and its control for application of electric vehicles.(l3)
- Choose proper energy storage systems for vehicle applications. (l3)
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.(l3)

Text Books :

1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", 2nd edition, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, "Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach", illustrated edition, John Wiley & Sons, 2014.
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.

References:
1. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.
2. John G. Hayes, G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", 1st edition, Wiley-Blackwell, 2018.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE) – III-I   **L T P C**
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(19A03506b)   RAPID PROTOTYPING
OPEN ELECTIVE-I

Course Objectives:
- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes.

UNIT – I   **10 Hours**

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

RP Software: Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

Learning Outcomes:

At the end of the unit, the student will be able to
- Explain prototyping process. (l2)
- Classify different rapid prototyping processes. (l2)
- Summarize rp software's and represent a 3d model in stl format, other rp data formats. (l2)

UNIT – II   **8 Hours**

Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.

Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. **Laminated Object Manufacturing (LOM):** Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. (L2)
- Identify the materials for Solid and Liquid based AM systems. (L2)

UNIT – III   8 Hours

Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Other RP Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. (L2)
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. (L2)

UNIT – IV   8 Hours

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify Rapid Tooling methods. (L2)
- Explain the concepts of reverse engineering and scanning tools. (L2)

UNIT – V   **8 Hours**

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Learning Outcomes:

At the end of the unit, the student will be able to
- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. (L2)
- Apply of RP in engineering design analysis and medical applications. (L3)

Course Outcomes:

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

- Use techniques for processing of CAD models for rapid prototyping. (L3)
- Understand and apply fundamentals of rapid prototyping techniques. ((L3)
- Use appropriate tooling for rapid prototyping process. (L3)
- Use rapid prototyping techniques for reverse engineering. (L3)
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. (L3)

Text Books:

1. Chua C.K., Leong K.F. and Lim C.S., "Rapid Prototyping: Principles and Applications", 2nd edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", 1st Edition, Springer, 2010.
3. Rafiq Noorani, "Rapid Prototyping: Principles and Applications in Manufacturing", John Wiley & Sons, 2006.

Reference Books:

1. Liou W. Liou, Frank W., Liou, "Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development", CRC Press, 2007.
2. Pham D.T. and Dimov S.S., "Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling", Springer, London 2001.
3. Gebhardt A., "Rapid prototyping", Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., "Rapid Tooling: Technologies and Industrial Applications", CRC Press, 2005.

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B.Tech (EEE)– III-I   **L   T   P   C**
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(19A04506a) ANALOG ELECTRONICS
OPEN ELECTIVE-I

Course Objectives:

- To understand the characteristics of various types of electronic devices and circuits (L1).
- To apply various principles of electronic devices and circuits to solve complex Engineering problems (L2).
- To analyze the functions of various types of electronic devices and circuits (L3).
- To evaluate the functions of various types of electronic devices and circuits in real time applications (L3).
- To design various types of electronic circuits for use in real time applications (L4).

UNIT-I:

Diodesand Applications

Properties of intrinsic and extrinsic semiconductor materials. Characteristics of PN junction diode and Zener diode. Applications of PNdiode as a switch, rectifier and Zener diode as regulator. Special purpose diodes: Schottky diode, Tunnel diode, Varactor diode, photodiode and LED.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the characteristics of various types of diodes (L1).
- Apply the principles of diodes to solve complex Engineering problems (L2).
- Analyze the functions of diodes in forward and reverse bias conditions (L3).
- Evaluate the functions of diodes in real time applications (L3).
- Design rectifiers and switches using diodes (L4).

UNIT-II:

BJT and its Applications

Construction, Operation, and Characteristics in CE, CB and CC configurations. Fixed-Bias and Voltage Divider-Bias. Applications as switch and amplifier.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the characteristics and biasing of BJT (L1).
- Apply the principles of BJT to solve complex Engineering problems (L2).
- Analyse the functions of BJT in various configurations (L3).
- Evaluate the functions of BJT in real time applications (L3).
- Design amplifiers and switches using BJT (L4).

UNIT-III:

FETs and Applications

JFETs: Construction, Operation, and Characteristics in CS configurations. Fixed-Bias and Voltage Divider -Bias. Applications as switch and amplifier.
MOSFETs: Construction, Operation, and Characteristics of Enhancement and Depletion modes in CS configurations. Biasing in Enhancement and Depletion modes. Applications as switch.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the characteristics and biasing of FETs (L1).
- Apply the principles of FETsto solve complex Engineering problems (L2).
- Analyze the functions of FETs in CSconfiguration (L3).
- Evaluate the functions of FETs in real time applications (L3).
- Design amplifiers and switches using FETs (L4).

UNIT-IV:
Feedback Amplifiers and Oscillators
Feedback Amplifiers: Concept of feedback, General characteristics of negative feedback amplifiers, Voltage-series, Current-series, Voltage-shunt, and Current-shunt feedback amplifiers.
Oscillators: Conditions for oscillations, Hartley and Colpitts oscillators, RC phase-shift and Wien-bridge oscillators.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the concept of negative & positive feedback and characteristics feedback amplifiers (L1).
- Apply the principles of feedback amplifiers and oscillators to solve complex Engineering problems (L2).
- Analyze the functions of feedback amplifiers and oscillators (L3).

- Evaluate the functions of feedback amplifiers and oscillators in real time applications (L3).
- Design feedback amplifiers and oscillators for specific applications (L4).

UNIT-V:
Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits

Wave-Shaping & Multivibrator Circuits: Introduction, Waveform Shaping Circuits –RC and RL Circuits. Clippers, Comparator and Clampers. Bistable, Schmitt Trigger, Monostable and Astable Multivibrators.

Linear Integrated Circuits: Operational Amplifier: Introduction, Block diagram, Basic applications – Inverting, Non-inverting, Summing amplifier, Subtractor, Voltage Follower. IC 555 Timer and IC 7805 Regulator.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the operation of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L1).
- Apply the principles of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits to complex Engineering solve problems (L2).
- Analyse the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L3).
- Evaluate the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits in real time applications (L3).
- Design Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits for specific applications (L4).

Note: In all the units, only qualitative treatment is required.

Course Outcomes:

At the end of the course, the student should be able to
- Understand the characteristics of various types of electronic devices and circuits
- Apply various principles of electronic devices and circuits to solve complex
- Engineering problems
- Analyse the functions of various types of electronic devices and circuits, Evaluate the functions of various types of electronic devices and circuits in real time applications
- Design various types of electronic circuits for use in real time applications.

TEXT BOOKS:

1. S. Salivahanan and N. Suresh Kumar, "Electronic Devices and Circuits", 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2017.

REFERENCES:

1. J. Milliman, Christos C Halkias, and Satyabrata Jit, "Electronics Devices and Circuits", 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2015.
2. David A. Bell "Electronics Devices and Circuits", 5th Edition, Oxford University Press, 2008.

Blooms' learning levels:
L1: Remembering and Understanding
L2: Applying
L3: Analyzing/Derive
L4: Evaluating/Design
L5: Creating

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B.Tech (EEE)– III-I   **L   T   P   C**
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(19A04506b) DIGITAL ELECTRONICS
OPEN ELECTIVE-I

Course Objectives:

- To introduce different methods for simplifying Boolean expressions
- To analyze logic processes and implement logical operations using combinational logic circuits
- To understand characteristics of memory and their classification.
- To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
- To understand concept of Programmable Devices

UNIT- I

Minimization Techniques and Logic Gates Minimization Techniques**:** Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions – Quine - McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND– NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.

Learning Outcomes:

At the end of the unit, the student should be able to:
- Learn Boolean algebra and logical operations in Boolean algebra. (L1)
- Apply different logic gates to functions and simplify them. (L2)
- Analyze the redundant terms and minimize the expression using Kmaps and tabulation methods (L3)

UNIT- II

Combinational Circuits -Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

Learning Outcomes:

At the end of the unit, the student should be able to:
- Apply the logic gates and design of combinational circuits(L2)
- Design of different combinational logic circuits(L4)

UNIT -III

Sequential Circuits-Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

Learning Outcomes:

At the end of the unit, the student should be able to:
- Understand the clock dependent circuits (L1)
- Identify the differences between clocked and clock less circuits, apply clock dependent circuits(L2)
- Design clock dependent circuits(L4)

UNIT -IV
Memory Devices Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

Learning Outcomes:

At the end of the unit, the student should be able to:
- Understand the principle of operation of basic memory devices, and programmable logic devices. (L1)
- Implement combinational logic circuits using memory and programmable logic devices (L2)

UNIT -V

Synchronous and Asynchronous Sequential Circuits Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.

Learning Outcomes:

At the end of the unit, the student should be able to:
- Understand how synchronous and asynchronous sequential circuit works (L1)
- Understand the FSM and its design principles. (L1)
- Analyze the procedure to reduce the internal states in sequential circuits (L3)
- Illustrate minimization of complete and incomplete state machines and to write a minimal cover table(L2)

Course Outcomes:

- Explain switching algebra theorems and apply them for logic functions, discuss about digital logic gates and their properties, Identify the importance of SOP and POS canonical forms in the minimization of digital circuits.
- Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method.
- Analyze the design procedures of Combinational & sequential logic circuits.
- Design of different combinational logic circuits, and compare different semiconductor memories.

Text Books:

1. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Zvi Kohavi, "Switching and Finite Automata Theory", 3rd Edition, South Asian Edition, 2010,

References:

1. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
2. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
3. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
4. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006.

5. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011
6. Donald D.Givone, "Digital Principles and Design", TMH, 2003.

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B.Tech (EEE)– III-I   **L   T   P   C**
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(19A05506a) FREE AND OPEN SOURCES SYSTEMS
(Open Elective –I)
(Common to CSE & IT)

Course Objectives:

This course is designed to:
- Understand the context and operation of free and open source software (FOSS) communities and associated software projects.
- Motivate the students to contribute in FOSS projects
- Familiarize with programming languages like Python, Perl, Ruby
- Elucidate the important FOSS tools and techniques

UNIT I PHILOSOPHY
Notion of Community--Guidelines for effectively working with FOSS community--, Benefits of Community based Software Development --Requirements for being open, free software, open source software –Four degrees of freedom - FOSS Licensing Models - FOSS Licenses – GPL-AGPL-LGPL - FDL - Implications – FOSS examples.

Learning outcomes:

At the end of the unit, students will be able to:
- Analyze the benefits of Community based Software Development. (L4)
- Explain the degrees of Freedom. (L2)

UNIT II LINUX
Linux Installation and Hardware Configuration – Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - Boot-Time Kernel Options- X Windows System Configuration-System Administration – Backup and Restore Procedures- Strategies for keeping a Secure Server.

Learning outcomes:

At the end of the unit, students will be able to:
- Demonstrate Linux Installation and hardware configuration. (L2)
- Compare Linux and Windows System Configurations. (L4)

UNIT III PROGRAMMING LANGUAGES
Programming using languages like Python, Perl, Ruby

Learning outcomes:

At the end of the unit, students will be able to:
- Explain the syntax of programming Languages Python, Perl and Ruby. (L2)
- Develop applications in the Open source programming Languages. (L6)

UNIT IV PROGRAMMING TOOLS AND TECHNIQUES
Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent, – Bug Tracking Systems- Package Management Systems

Learning outcomes:

At the end of the unit, students will be able to:
- List various programming tools and explain their uses (L1)
- Make use of the various tools while building applications (L3)

UNIT V FOSS CASE STUDIES
Open Source Software Development - Case Study – Libre office -Samba

Learning outcomes:

At the end of the unit, students will be able to:
- Elaborate the open Source Software Development(L6)
- Compare Libre office with its proprietary equivalent (L5)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Demonstrate Installation and running of open-source operating systems.(L2)
- Justify the importance of Free and Open Source Software projects. (L5)
- Build and adapt one or more Free and Open Source Software packages. (L6)
- Utilize a version control system. (L3)
- Develop software to and interact with Free and Open Source Software development projects.(L3)

TEXT BOOK:
Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", Sixth Edition, OReilly Media, 2009.

REFERENCES:

1. Philosophy of GNU URL: http://www.gnu.org/philosophy/.
2. Linux Administration URL: http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/.
3. The Python Tutorial available at http://docs.python.org/2/tutorial/.
4. Perl Programming book at http://www.perl.org/books/beginning-perl/.
5. Ruby programming book at http://ruby-doc.com/docs/ProgrammingRuby/.
6. Version control system URL: http://git-scm.com/.
7. Samba: URL : http://www.samba.org/.
8. Libre office: http://www.libreoffice.org/.

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B.Tech (EEE)– III-I

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(19A05506b) COMPUTER GRAPHICS and MULTIMEDIA ANIMATION
(Open Elective –I)
(Common to CSE & IT)

Course Objectives:

This course is designed to:

- Introduce the use of the components of a graphics system and become familiar with the building approach of graphics system components and related algorithms.
- Understand the basic principles of 3- 3-dimensional computer graphics.
- Provide insites on how to scan, convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from world coordinates to device coordinates, clipping, and projections.
- Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

UNIT I OVERVIEW OF COMPUTER GRAPHICS SYSTEM

OverView of Computer Graphics System – Video display devices – Raster Scan and random scan system – Input devices – Hard copy devices.

Learning outcomes:

At the end of the unit, students will be able to:
- Explain the overview of computer graphics with visualization. (L2)
- Classify the Input devices. (L2)
- Distinguish raster scan and random scan systems. (L4)

UNIT II OUTPUT PRIMITIVES AND ATTRIBUTES

Drawing line, circle and ellipse generating algorithms – Scan line algorithm – Character Generation – attributes of lines, curves and characters – Antialiasing.

Learning outcomes:

At the end of the unit, students will be able to:
- Analyse output primitives and attributes. (L4)
- Design algorithms based on output. (L6)

UNIT III TWO DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING:

Two-dimensional Geometric Transformations – Windowing and Clipping – Clipping of lines and clipping of polygons.

Learning outcomes:

At the end of the unit, students will be able to:
- Create two-dimensional graphics. (L6)
- Examine the clipping of polygon. (L4)
- Compare different forms of variations. (L2)

UNIT IV THREE DIMENSIONAL GRAPHICS AND VIEWING

Three-dimensional concepts – Object representations- Polygon table, Quadric surfaces, Splines, Bezier curves and surfaces – Geometric and Modelling transformations – Viewing - Parallel and perspective projections.

Learning outcomes:

At the end of the unit, students will be able to:
- Create three-dimensional graphics. (L6)
- Explain the Quadric surfaces and polygon table. (L2)
- Define modelling transformations. (L1)

UNIT V REMOVAL OF HIDDEN SURFACES

Visible Surface Detection Methods – Computer Animation.

Learning outcomes:

At the end of the unit, students will be able to:
- List the different types of detection methods. (L1)
- Compare various computer animations. (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Explain the basic concepts used in computer graphics. (L2)
- Inspect various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. (L4)
- Assess the importance of viewing and projections. (L5)
- Define the fundamentals of animation, virtual reality and its related technologies. (L3)
- Analyze the typical graphics pipeline (L4)

TEXTBOOK

1. Hearn, D. and Pauline Baker,M., Computer Graphics (C-Version), 2nd Edition, Pearson Education, 2002.

REFERENCES

1. Neuman, W.M., and Sproull, R.F., Principles of Interactive Computer Graphics, Mc Graw Hill Book Co., 1979.
2. Roger, D.F., Procedural elements for Computer Graphics, Mc Graw Hill Book Co., 1985.
3. Asthana, R.G.S and Sinha, N.K., Computer Graphics, New Age Int. Pub. (P) Ltd., 1996.
4. Floey, J.D., Van Dam, A, Feiner, S.K. and Hughes, J.F, Computer Graphics, Pearson Education, 2001.

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B.Tech (EEE)– III-I   **L   T   P   C**
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(19A27506a)   BREWING TECHNOLOGY
OPEN ELECTIVE - I

PREAMBLE

This course covers the origin of brewing and ingredients used, methods and equipment used and innovations in this field.

Coues Objectives

- To understand the Beer manufacturing, ingredients and their roles.
- To understand overall view of a brewing industry

UNIT – I

Introduction of brewing, history of brewing; Raw materials: barley, hops, water, yeast; Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc. Malt production, role of enzymes for malting; Barley storage, steeping, germination, kilning, cooling, storage;

Learning Outcomes:

At the end of the unit, the student should be able to:
- Introduction of brewing, history of brewing
- Raw materials like barley, hops, water, yeast
- Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc
- Malt production, role of enzymes for malting
- Barley storage, steeping, germination, kilning, cooling, storage

UNIT – II

Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract; Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels; Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation; Conversion of fatty matter, Biological acidification

Learning Outcomes:

At the end of the unit, the student should be able to:
- Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract
- Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels
- Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation
- Conversion of fatty matter, Biological acidification

UNIT – III

Beer production methods, fermentation technology, changes during fermentation; Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process; Packaging equipment and packaging materials, storage conditions and distribution process

Learning Outcomes:

At the end of the unit, the student should be able to:
- Beer production methods, fermentation technology, changes during fermentation
- Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process
- Packaging equipment and packaging materials, storage conditions and distribution process

UNIT – IV

Brewing Equipment. Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers, pumps beer bottles, cans, labels, bottle caps, sanitation equipments Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

Learning Outcomes:

At the end of the unit, the student should be able to:
- Brewing Equipments like Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers
- pumps beer bottles, cans, labels, bottle caps, sanitation equipments
- Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

UNIT – V

Recent advances: Immobilized Cell Technology in Beer Production, immobilized yeast cell technology Energy management in the brewery and maltings; waste water treatment Automation and plant planning

Learning Outcomes:

At the end of the unit, the student should be able to:
- Immobilized Cell Technology in Beer Production, immobilized yeast cell technology
- Energy management in the brewery and maltings
- waste water treatment Automation and plant planning

Course Outcomes:

By the end of this course, students will attain the:
- Knowledge of beer making, chemistry of ingredients used for brewing,
- Knowledge on brewing industry, Unit operations and equipments involved.

TEXT BOOKS

1. Brewing: "Science and Practice, Brookes and Roger Stevens", Dennis E. Briggs, Chris A. Boulton, Peter A. 2004, Woodhead publishing limited.
2. Die Deutsche "Bibliothek Technology: "Brewing and Malting", Wolfgang Kunze. 2010, Bibliographic information published

REFERENCES

1. "Handbook of Brewing": Process, Technology, Markets, Hans Michael Eblinger. 2009, Wiley-VCH Verlag GmbH & Co.
2. Brewing: "New Technologies", Charles W. Bamforth. 2006, Woodhead Pub.

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B.Tech (EEE)– III-I   **L   T   P   C**
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(19A27506b) COMPUTER APPLICATIONS IN FOOD INDUSTRY
(OPEN ELECTIVE – I)

PREAMBLE

This course covers all facets of computerization and various software's used and their usage.

Course Objectives

- Able to know about "The necessity of Software & their applications in Food Industries"
- Able to Implement the Programs in 'C' to perform various operations that are related to Food Industries.

UNIT – I

Computerization, Importance of Computerization in food industry and IT applications in food industries. Computer operating environments and information system for various types of food industries. Introduction to Bar charts and Pie charts & the procedure to develop bar charts and pie charts on given Data.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Computerization, Importance of Computerization in food industry and IT applications in food industries.
- Computer operating environments and information system for various types of food industries.
- Introduction to Barcharts and Piecharts & the procedure to develop barcharts and piecharts on given Data.

UNIT – II

Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts, Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'. Steps in learning 'C' (Character set, Identifiers, Keywords) Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts
- Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'.
- Steps in learning 'C' (Character set, Identifiers, Keywords)
- Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

UNIT – III

Steps in learning 'C' (Operators, Statements) Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions). Basic Structure of a simple 'C' program. Decision Making/Control Statements. Branching, Concept of Looping & Looping statements.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Steps in learning 'C' (Operators, Statements)
- Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions).
- Basic Structure of a simple 'C' program. Decision Making/Control Statements.
- Branching, Concept of Looping & Looping statements.

UNIT – IV

Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions. Concept of various types of User Defined Functions (i.e., About 4 types). Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays). Concept of a String Library Functions.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions.
- Concept of various types of User Defined Functions (i.e., About 4 types).
- Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays).
- Concept of a String Library Functions.

UNIT – V

Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures) Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists. Concept of Stacks & Operations on Stacks (PUSH & POP Operations) Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & DEQUEUE Operations)

Learning Outcomes:

At the end of unit, students will be able to understand the following
  • Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures)
  • Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists.
  • Concept of Stacks & Operations on Stacks (PUSH & POP Operations)
  • Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & Dequeue Operations)

Course Outcomes

By the end of the course, the students will be able to
  • know about the various steps which are related to computer and Software and their application in Food Industries
  • know about the various steps which are necessary to implement the programs in 'C'

TEXT BOOKS
  1. Yeswanth Kanethkar, Let us 'C'
  2. Balaguruswamy E., "Computer Programming in 'C'"
  3. Mark Allen Waise , "Data Structures"

REFERENCES
  1. M. S Excel 2000, Microsoft Corporation
  2. M. S. Office – Microsoft Corporation
  3. Verton M.V. "Computer concepts for Agri Business", AVI Pub. Corp., West Port, USA.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE) –III-I   **L T P C**
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(19A54506a) OPTIMIZATION TECHNIQUES
(OPEN ELECTIVE-I)

Course Objectives:

The student will be able to learn:
- The basic concepts of Optimization
- The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
- About optimality of balanced transportation Problems
- About Constrained and unconstrained nonlinear programming.
- About principle of optimality and dynamic programming

UNIT – I Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- To know how to formulate statement of optimization problem with or without constraints
- To know about classification of single and multivariable optimization problems
- To know about necessary and sufficient conditions in defining the optimization problems
- To understand how to formulate Kuhn-Tucker conditions and to solve numerical problems

UNIT – II Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- To know about formulation of LPP
- To know about formulations of GPP
- To understand various theorems in solving simultaneous equations
- To understand about necessity of Simplex method and to solve numerical problems

UNIT – III Nonlinear Programming – One Dimensional Minimization methods

Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- To know about NLP in one dimensional optimization problems
- To understand about various search methods
- To learn about various interpolation methods
- To distinguish and compare the various elimination methods with numerical examples

UNIT – IV Unconstrained & Constrained Nonlinear Programming

Unconstrained Optimization Techniques: Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method

Constrained Optimization Techniques: Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- To distinguish between unconstrained and constrained optimization problems
- To learn about direct search methods in unconstrained NLP problems and comparison
- To understand about direct search methods in constrained NLP problems and comparison
- To do exercises for solving numerical examples of various methods

UNIT – V Dynamic Programming

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- To know what is DP problem?
- To know about computational procedure in solving DPP
- To know Calculus and Tabular methods of solving with numerical examples of various methods

Course Outcomes:

The student gets thorough knowledge on:
- Basic methods, principles in optimization
- Formulation of optimization models, solution methods in optimization
- Finding initial basic feasible solutions.
- Methods of linear and non-linear (constrained and unconstrained) programming.
- Applications to engineering problems.

TEXT BOOKS:

1. S. S. Rao, "Engineering optimization": Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana & K.D. Kumar, "Introductory Operations Research Springer (India)", 2004.

REFERENCES:

1. R Fletcher, "Practical Methods of Optimization" , 2nd Edition, Wiley Publishers, 2000.
2. Jorge Nocedal and Wright S, "Numerical Optimization Springer", 1st Edition, 1999.
3. by K.V. Mital and C. Mohan, "Optimization Methods in Operations Research and systems Analysis" 3rd Edition, New Age International (P) Limited, 1996.
4. by S.D. Sharma, "Operations Research", Kedar Nath, 2012.
5. by H.A. Taha, "Operations Research", 9th Edition, An Introduction Pearson, 2010.
6. G. Hadley, "Linear Programming", Narosa, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE) – III-I   **L   T   P   C**
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(19A52506a) TECHNICAL COMMUNICATION AND PRESENTATION SKILLS
(OPEN ELECTIVE)

Course Objectives:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

SYLLABUS

UNIT -1:

Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

Learning Outcomes:

At the end of the module, the learners will be able to
- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

UNIT -II

Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

Learning Outcomes:

At the end of the module, the learners will be able to
- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication
- Evaluate the different aspects of non-verbal communication.

UNIT -III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

Learning Outcomes:

At the end of the module, the learners will be able to
- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

UNIT -IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

Learning Outcomes:

At the end of the module, the learners will be able to
- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

UNIT -V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Learning Outcomes:

At the end of the module, the learners will be able to
- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

Course Outcomes

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentations
- Create trust among people and develop employability skills

TEXT BOOKS:

1. Ashrif Rizvi, "Effective Technical Communication"**,** TataMcGrahill, 2011
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication", 3rd Edition, O U Press 2015

REFERENCES:

1**.** Pushpalatha & Sanjay Kumar, "Communication Skills", Oxford Univsesity Press
2. Barron's/Books on TOEFL/GRE/GMAT/CAT/IELTS DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. Universities Press (India) Pvt Ltd., "Management Shapers Series", Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, "Successful Presentations" Oxford.
6. Edgar Thorpe and Showick Thorpe, "Winning at Interviews" Pearson
7. Munish Bhargava, "Winning Resumes and Successful Interviews", McGraw Hill

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)–III-I Sem

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19A02501P AC MACHINES LAB

Course outcomes:

By the end of the course, the student will be able to:

- Analyze and apply load test, no-load and blocked-rotor tests for construction of circle diagram and equivalent circuit determination in a single phase induction motor.
- Predetermine regulation of a three-phase alternator by synchronous impedance & m.m.f methods.
- Predetermine the regulation of Alternator by Zero Power Factor method
  X_d and X_q determination of salient pole synchronous machine.
- Evaluate and analyze V and inverted V curves of 3 phase synchronous motor

From the following list all the ten experiments are required to be conducted as compulsory experiments:

1. No-load & Blocked-rotor tests on Squirrel cage Induction motor.
2. Load test on three phase slip ring Induction motor.
3. Speed control of three phase induction motor
4. Rotor resistance starter for slip ring induction motor
5. Load test on single phase induction motor.
6. Determination of Equivalent circuit of a single phase induction motor.
7. Predetermination of Regulation of a three phase alternator by synchronous impedance & m.m.f methods.
8. Predetermination of Regulation of three-phase alternator by Z.P.F. method.
9. Determination of X_d and X_q of a salient pole synchronous machine.
10. V and inverted V curves of a 3-phase synchronous motor.

Reference Book:

1. D. P.Kothari and B. S. Umre, "Laboratory Manual for Electrical Machines" I.K International Publishing House Pvt. Ltd, 2017.
2. D.R. Kohli and S.K. Jain, "A Laboratory Course in Electrical Machines" NEM Chand & Bros.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)– III-I Sem

L	T	P	C
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19A52601P   ENGLISH LANGUAGE SKILLS LAB

Course Objectives

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

UNIT-I

1. Phonetics for listening comprehension of various accents - 2
2. Formal Presentations using PPT slides without Graphic Elements
3. Paraphrasing

Learning Outcomes

At the end of the module, the learners will be able to
- Understand different accents spoken by native speakers of English
- Make formal structured presentations on general topics using PPT slides without graphical elements
- Paraphrase short academic texts using suitable strategies and conventions

UNIT-II

1. Debate – 2 (Following Argument)
2. Listening to short speeches/ short stories for note-making and summarizing
3. E-mail Writing

Learning Outcomes

At the end of the module, the learners will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements
- Write formal emails in the standard format

UNIT-III

1. Listening for Discussions
2. Group Discussions
3. Writing Persuasive/argumentative essays on general topics

Learning Outcomes

At the end of the module, the learners will be able to
- Follow a discussion to identify the salient points
- Participate in group discussions using appropriate conventions and language strategies
- Produce logically coherent persuasive/argumentative essays

UNIT-IV

1. Reviewing film/ book
2. Group Discussions – reaching consensus in Group Work
3. Resume Writing – Cover Letter – Applying for Internship

Learning Outcomes

At the end of the module, the learners will be able to
- Judge a film or book
- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions
- Prepare a CV and write a cover letter to seek internship/ job

UNIT-V

1. Writing Project Reports
2. Editing Short Texts
3. Answering FAQs in Interviews

Learning Outcomes

At the end of the module, the learners will be able to
- Collaborate with a partner to make effective presentations
- Understand the structure and produce an effective project report.
- Edit short texts according to different needs of the work place.

Course Outcomes

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

SUGGESTED SOFTWARE:

1. Walden Infotech English Language Communication Skills.
2. iTell- Orell Digital Language Lab
3. Digital Teacher
4. LES(Learn English Select) by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press 2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey& Joanne Buckely "Handbook for Technical Writing" CENGAGE Learning 2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam. (Macmillan), 2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011
Note: Links provided by APSHE on LSRW, grammar and vocabulary

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B.Tech (EEE)–III-I Sem   **L   T   P   C**
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(19A02506) POWER ELECTRONICS AND SIMULATION LAB

Course Objectives:

By the end of the course the student will be able to:
- Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
- Analyze the operation of single-phase half & fully-controlled converters and inverters with different types of loads.
- Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo converters with different loads.
- Create and analyze various power electronic converters using PSPICE software.

Any Eight of the Experiments in Power Electronics Lab

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's: (a) R triggering (b) R-C triggering
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase Half controlled converter with R load
10. Three Phase half controlled bridge converter with R-load
11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge converter with R and RL loads
13. Single Phase dual converter with RL loads

Any two simulation experiments with PSPICE/PSIM
14. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
15. PSPICE simulation of resonant pulse commutation circuit and Buck converters and chopper.
16. PSPICE simulation of single phase Inverter with PWM control.

REFERENCE BOOKS:

1. O.P. Arora, "Power Electronics Laboratory: Theory, Practice and Organization (Narosa series in Power and Energy Systems)", Alpha Science International Ltd., 2007.
2. M.H.Rashid, "Simulation of Electric and Electronic circuits using PSPICE", M/s PHI Publications.
3. PSPICE A/D user's manual – Microsim, USA.
4. PSPICE reference guide – Microsim, USA.
5. MATLAB and its Tool Books user's manual and – Math works, USA.

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B.Tech (EEE)– III-I Sem	L	T	P	C
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Socially Relevant Projects

6. Energy Auditing

7. Solar Water Pumping Systems

8. Automatic Traffic Light Control Systems

9. Building Electrical Safety Measures

10. Electrical Protection Systems in Agricultural Fields

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)– III-I Sem   **L   T   P   C**
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19A99601   MANDATORY COURSE: RESEARCH METHODOLOGY

Course Objectives :

The objective of this course is
- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues n research

Syllabus
UNIT I

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of research and its process
- Explain various types of research
- Know the steps involved in research design
- Understand the different research approaches

UNIT II

Sampling Design – steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of sampling and sampling design
- Explain various techniques in measurement and scaling
- Learn various methods of data collection
- Design survey questionnaires for different kinds of research
- Analyze the questionnaires

UNIT III

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

Learning Outcomes:-

After completion of this unit student will
- Know the association of two variables
- Understand the importance of correlation and regression
- Compare and contrast correlation and regression
- Learn various types of correlation
- Apply the knowledge of C&R Analysis to get the results

UNIT IV

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

Learning Outcomes:-

After completion of this unit student will

- Know the statistical inference
- Understand the hypothesis testing procedure
- Compare and contrast Parametric and Non-parametric Tests
- Understand the use of chi-square test in investigating the distribution of categorical variables
- Analyze the significance of variance and covariance

UNIT V
Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Learning Outcomes:-

After completion of this unit student will
- Learn about report writing
- Understand how to write research paper
- Explain various techniques of interpretation
- Understand the importance of professional ethics in research
- Design a scientific paper to present in the conferences/seminars

Course Outcomes:

At the end of the course, students will be able to
- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes

- Read. comprehend and explain research articles in their academic discipline

- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

Text books:
1. C.R.Kothari, "Research Methodology:Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology": Ranjit Kumar, Sage Publications

REFERENCES:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books,New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.
3. S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications

B.Tech (EEE) – III-II Sem   **L   T   P   C**
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(19A04301) SIGNALS AND SYSTEMS

Course Objectives:

- To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To analyze characteristics of linear systems in time and frequency domains.
- To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

UNIT- I

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error, Fourier series: Trigonometric & Exponential, Properties of Fourier series, concept of discrete spectrum, Illustrative Problems.

Learning Outcomes:-

After completion of this unit student will
- Understand different types of signals and systems. (L1)
- State principles of vector spaces and concept of Orthogonality. (L2)
- Describe continuous time signal and discrete time signal. (L2)
- Analyze the periodic signals by applying Fourier series. (L3)

UNIT- II
Continuous Time Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Learning Outcomes:-

After completion of this unit student will
- Identify system properties based on impulse response and Fourier analysis. (L1)
- Analyze the spectral characteristics of signals. (L3)

- Illustrate signal sampling and its reconstruction. (L2)
- Apply Fourier transform to solve problems. (L2)

UNIT- III

DISCRETE TIME FOURIER TRANSFORM: Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems, Illustrative Problems.

Learning Outcomes:-

After completion of this unit student will
- Understand the properties of the discrete-time Fourier transform. (L1)
- Analyse the spectral characteristics of signals using Fourier transform. (L3)
- Evaluate the Fourier transform of Discrete-time signals. (L2)

UNIT- IV

Signal Transmission Through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

Learning Outcomes:-

After completion of this unit student will
- Understand the impulse response, transfer characteristics of LTI system and various filters. (L1)
- Analyse filter characteristics and physical realisation of LTI system. (L3)
- Apply the relation between bandwidth and rise time & energy and power spectral densities in various applications. (L2)

UNIT- V

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.
Z–TRANSFORM: Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions, Illustrative Problems.

Learning Outcomes:-

After completion of this unit student will
- Understand the limitations of Fourier transform and need for Laplace transform and develop. (L1)
- Apply transform techniques to analyse discrete-time signals and systems. (L2)
- Evaluate response of linear systems to known inputs by using Laplace transforms. (L2)
- Analyze the continuous-time and discrete-time signals and systems using Laplace and Z-transforms.(L3)

Course Outcomes:

After completion of the course, student will be able to

- Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques. (L1)
- Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L2)
- Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods. (L3)
- Classify the systems based on their properties and determine the response of them. (L4)

Text Books:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", PHI, 2nd Edition, 2009.
2. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition, 2005.

References:

1. BP Lathi, "Principles of Linear Systems and Signals", Oxford University Press, 2nd Edition, 2015.
2. Matthew N.O. Sadiku and Warsame H. Ali, "Signals and Systems A primer with MATLAB", CRC Press, 2016.
3. Hwei Hsu, "Schaum's Outline of Signals and Systems", Fourth Edition, TMH, 2019.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)– III-II Sem   **L T P C**
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(19A02601T)   DIGITAL COMPUTE PLATFORMS

Course Objectives:

- Architecture and designing of 8086 Microprocessor with Assembling language programming and interfacing with various modules
- Understand the Interfacing of 8086 with various advanced communication devices
- Designing of 8051 Microcontroller with Assembling language programming and interfacing with various modules
- To know about Assembly Language Programs for the Digital Signal Processors and usage of Interrupts
- To understand Xilinx programming and understanding of Spartan FPGA board

UNIT-I:

INTRODUCTION TO MICROPROCESSORS

Historical background- Evolution of microprocessors up to 64-bit. Architecture of 8086 microprocessor, special function of general purpose registers. 8086 flag registers and functions of 8086 flags – Addressing modes of 8086 – Instruction set of 8086 – Assembler directives - Pin diagram 8086 – Minimum mode and maximum mode of operation - Timing diagrams - CISC and ARM Processors.

Learning Outcomes:-

After completion of this unit student will
- To know about 8086 as one of digital compute platforms
- To know about Architecture and functions of 8086
- To understand about instruction set
- To know about pin and timing diagrams
- To know about processors CISC and ARM

UNIT II:

ASSEMBLY LANGUAGE PROGRAMMING & I/O INTERFACE

Assembler directives – macros – simple programs involving logical – branch instructions – sorting – evaluating arithmetic expressions - string manipulations – 8255 PPI - various modes of operation - A/D - D/A converter interfacing, Memory interfacing to 8086 – interrupt structure of

8086 – vector interrupt table – interrupt service routine – interfacing interrupt controller 8259 - Need of DMA – serial communication standards – serial data transfer schemes.

Learning Outcomes:-

After completion of this unit student will
- To understand the programming features of assembly language as one of digital compute platforms
- To know about evaluation of expressions, strings
- To understand about interfacing with A/D-D/A converters
- To understand about interrupt structures and various service routines in 8086
- To know about data transfer scheme

UNIT III:

8051 MICRO CONTROLLER PROGRAMMING AND APPLICATIONS

Introduction to micro controllers, Functional block diagram, Instruction sets and addressing modes, interrupt structure – Timer – I/O ports – serial communication. Data transfer, manipulation, Control and I/O instructions – simple programming exercises key board and display interface – Closed loop control of servo motor – stepper motor control.

Learning Outcomes:-

After completion of this unit student will
- To understand about 8051 Microcontroller as one of the digital compute platforms
- To know about instruction sets of 8051
- To know about data transfer manipulations
- To understand and write programming using 8051
- To know about a few applications of 8051 like servo motor, stepper motor

UNIT IV:

Introduction to the TMS320LF2407 DSP Controller

Basic architectural features - Physical Memory - Software Tools. Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers. C2xx DSP CPU and Instruction Set: Introduction & code Generation - Components of the C2xx DSP core - Mapping External Devices to the C2xx core - peripheral interface - system configuration registers - Memory - Memory Addressing Modes - Assembly Programming Using the C2xx DSP Instruction set.

Learning Outcomes:-

After completion of this unit student will
- To know about features of DSP controller C2xx as one of the DCPs
- To know about various instruction sets, control registers of C2xx DSP core
- To know about mapping of external devices to the DSP core
- To know about assembly programming using the instruction sets of TMS320LF2407 DSP controller

UNIT V:

FPGA

Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA – Xilinx, XC3000 series - Configurable logic Blocks (CLB) – Input / Output Block (IOB) – Programmable Interconnect Point (PIP) – Xilinx 4000 series – HDL programming –overview of Spartan 3E and Virtex II pro FPGA boards- case study.

Learning Outcomes:-

After completion of this unit student will
- To know about FPGA as one of the digital compute platforms
- To know about various types of FPGA
- To know about programmable inter connect points
- To understand about Xilinx-HDL programming
- To know about applications of FPGA with a case study

Course Outcomes:

1. Understand the basic architecture & pin diagram of 8086 microprocessor.
2. Assembly language programming to perform a given task, Interrupt service routines for all interrupt types
3. Microprocessor and Microcontroller designing for various applications.
4. Write Assembly Language Programs for the Digital Signal Processors and use Interrupts for real-time control applications
5. Write Xilinx programming and understanding of Spartan FPGA board

TEXT BOOKS

1. Ramesh S. Gaonkar, "Microprocessor Architecture Programming and Applications with 8085", Penram Intl. Publishing, 6th Edition, 2013
2. Ray A. K., Bhurchandi K. M., "Advanced Microprocessor and Peripherals", Tata McGraw-Hill Publications, 3rd Edition, 2013.

REFERENCE BOOKS

1. Douglas V Hall, "Microprocessor and Interfacing", 2nd Edition, Tata McGraw hill, 1992
2. Nilesh B Bahadure, "Microprocessor", PHI, 2010.
3. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications Pearson International publishing (India).
4. Hamid A. Tolyat, "DSP Based Electro Mechanical Motion Control", CRC press, 2004.
5. Application Notes from the webpage of Texas Instruments.
6. XC 3000 series datasheets (version 3.1). Xilinx Inc., USA, 1998
7. XC 4000 series datasheets (version 1.6). Xilinx Inc., USA, 1999
8. Wayne Wolf, FPGA based system design, Prentice hall, 2004.

B.Tech (EEE)– III-II Sem **L T P C**
2 1 0 3

(19A02602) POWER SYSTEM ANALYSIS

Course Objectives:

To make the students learn about:

- The use of per unit values and graph theory concepts, solving a problem using computer.
- Formation of Y_{bus} and Z_{bus} of a Power System network, power flow studies by various methods.
- Different types of faults and power system analysis for symmetrical and also unsymmetrical faults.
- Analysis of power system for steady state and transient stability and also methods to improve stability.

UNIT -I

p. u. system and Y_{bus} formation

Per-Unit representation of Power system elements - Per-Unit equivalent reactance network of a three phase Power System - Graph Theory: Definitions, Bus Incidence Matrix, Y_{Bus} formation by Direct and Singular Transformation Methods, Numerical Problems.

Learning Outcomes:-

At the end of the unit, the student will be able to

- Understand the concepts of Per-Unit equivalent system
- To know about basic graph theory concepts as applied to power systems
- To compute the Bus Incidence matrix
- To formulate Y_{Bus} matrix using different methods.

UNIT -II

Formation of Z_{bus}

Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses - Modification of Z_{Bus} for the changes in network (Problems)

Learning Outcomes:

At the end of the unit, the student will be able to
- Analyze the concept of formation of Z_{Bus}
- To develop algorithm for modification of Z_{Bus}.
- Determine the Z_{Bus} matrix
- To compute modified Z_{Bus} for the changes in network.

UNIT –III

Power flow Analysis

Static load flow equations – Load flow solutions using Gauss Seidel Method: Algorithm and Flowchart. Acceleration Factor, Load flow Solution for Simple Power Systems (Max. 3-Buses): Newton Raphson Method in Polar Co-Ordinates Form: Load Flow Solution- Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods.- Comparison of Different Methods

Learning Outcomes:

At the end of the unit, the student will be able to
- Understand about Load flow Solution for Simple Power Systems.
- To determine the Load flow Solution using Gauss Seidel iterative method
- To determine the Load flow Solution using NR method in polar form
- To determine solution of DLF and FDLF
- To know about comparison of various Load flow solutions

UNIT – IV

Short Circuit Analysis

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Symmetrical Component Theory:, Positive, Negative and Zero sequence components: Positive, Negative and Zero sequence Networks. Unsymmetrical Fault Analysis: LG, LL, LLG and LLLG faults with and without fault impedance, Numerical Problems.

Learning Outcomes:

At the end of the unit, the student will be able to
- Analyze the Calculations of MVA Calculations, Fault levels

- To understand about Sequence Components.
- Calculate the fault current using sequence impedances for unsymmetrical faults
- To determine the fault current for symmetrical faults

UNIT –V

Stability Analysis
Elementary concepts of Steady State, Dynamic and Transient Stabilities. Derivation of Swing Equation, Power Angle Curve and Determination of Steady State Stability. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Numerical methods for solution of swing equation - Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

Learning Outcomes:

At the end of the unit, the student will be able to
- Learn the stability and types of stability
- Analyze the stability using equal area criterion
- To understand methods to improve stability
- Understand and evaluation of fault clearing angle and time

Course Outcomes:

After completing the course, the student should be able to do the following:
- Remember and understand the concepts of per unit values, Y Bus and Z bus formation, load flow studies, symmetrical and unsymmetrical fault calculations.
- Apply the concepts of good algorithm for the given power system network and obtain the converged load flow solution and experiment some of these methods using modern tools and examine the results.
- Analyse the symmetrical faults and unsymmetrical faults and done the fault calculations, analyse the stability of the system and improve the stability. Demonstrate the use of these techniques through good communication skills.
- Develop accurate algorithms for different networks and determine load flow studies and zero, positive and negative sequence impedances to find fault calculations.
- Design and select efficient Circuit Breakers to improve system stability. Implement them in resolving various day-to-day issues ina Power System.

TEXT BOOKS:

1. G.W.Stagg and A.H.El "Computer Methods in Power System Analysis", Abiad, Mc Graw-Hill, 2006.
2. I.J.Nagrath & D.P.Kothari, "Modern Power system Analysis", 4th Edition, Tata McGraw-Hill Publishing Company, 2011.

REFERENCE BOOKS:

1. Grainger and Stevenson, "Power System Analysis", McGraw Hill, 1994.
2. Hadi Saadat, "Power System Analysis", McGraw Hill, 1998.
3. B.R.Gupta, "Power System Analysis and Design", S. Chand & Company, 2005.

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B.Tech (EEE)– III-II Sem   **L T P C**
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(19A02603a) ELECTRICAL DISTRIBUTION SYSTEM AUTOMATION

PROFESSIONAL ELECTIVE -II

Course Objectives:

- To know about fundamental aspects of distribution system
- To understand principle of distribution substations
- To know about classification of various loads
- To understand difference between conventional load flow studies of power system and distribution system load flow
- To know about evaluation of voltage droop and power loss calculations
- To know about distribution automation and management system, SCADA

UNIT-I:

DISTRIBUTION SYSTEM FUNDAMENTALS

Brief description about electrical power transmission and distribution systems, Different types of distribution sub-transmission systems, Substation bus schemes, Factors effecting the substation location, Factors effecting the primary feeder rating, types of primary feeders, Factors affecting the primary feeder voltage level, Factors effecting the primary feeder loading.

Learning Outcomes:-

After completion of this unit student will
- To understand various distribution system classifications
- To know more about primary feeders rating, types
- To know about substation location, bus schemes, etc.
- To know about factors effecting the primary feeder loading

UNIT-II:

DISTRIBUTION SYSTEM SUBSTATIONS AND LOADS

Substations: Rating of a distribution substation for square and hexagonal shaped distribution substation service area, K constant, Radial feeder with uniformly and non-uniformly distributed loading. **Loads:** Various types of loads, Definitions of various terms related to system loading, detailed description of distribution transformer loading, feeder loading, Modelling of star and delta connected loads, two-phase and single-phase loads, shunt capacitors.

Learning Outcomes:-

After completion of this unit student will
- To know about uniformly distributed loading in distribution substations
- To know about non-uniform distributed loading in distribution substations
- To know about classification of various types of loading
- To understand about modelling of various types of loads and shunt capacitor

UNIT-III:

DISTRIBUTION SYSTEM LOAD FLOW

Exact line segment model, Modified line model, approximate line segment model, Step-Voltage Regulators, Line drop compensator, Forward/Backward sweep distribution load flow algorithm – Numerical problems

Learning Outcomes:-

After completion of this unit student will
- To know about various distribution line models
- To know about step voltage regulator
- To know about line drop compensator
- To evaluate distribution load flow pattern using sweeping algorithms

UNIT-IV:

VOLTAGE DROP AND POWER LOSS CALCULATION

Analysis of non-three phase primary lines, concepts of four-wire multi-grounded common-neutral distribution system, Percent power loss calculation, Distribution feeder cost calculation methods, Capacitor installation types, types of three-phase capacitor-bank connections, Economic justification for capacitors – Numerical problems

Learning Outcomes:-

After completion of this unit student will
- To know about analysis of various distribution system configurations
- To know how to calculate percent power loss calculations
- To know about methods of calculating distribution feeder cost
- To understand about economic justification of capacitors
- To understand about installation of capacitors at various locations

UNIT-V:

DISTRIBUTION AUTOMATION

Distribution automation, distribution management systems, distribution automation system functions, Basic SCADA system, outage management, decision support applications, substation automation, control feeder automation, database structures and interfaces.

Learning Outcomes:-

After completion of this unit student will
- To know about basic concept of automation of distribution systems
- To know about various distribution management /automation systems and functions
- To know about Supervisory Control And Data Acquisition System
- To know about automation of feeders, substations, etc.
- To understand about database structures and interfacing

Course Outcomes:

- To understand basics of distribution systems and substations
- To understand about modelling of various loads
- To perform distribution load flow solutions
- To evaluate power loss and feeder cost
- To know the principles of SCADA, Automation distribution system and management

Text Books:

1. William H. Kersting, "Distribution System Modelling and Analysis", CRC Press, Newyork, 2002.
2. Turan Gonen, "Electric Power Distribution System Engineering", McGraw-Hill Inc., New Delhi, 1986.

Reference Books:

1. James Northcote-Green and Robert Wilson, "Control and automation of electrical power distribution systems", CRC Press (Taylor & Francis), New York, 2007.

B.Tech (EEE)– III-II Sem
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(19A02603b)   AC DRIVES

(PROFESSIONAL ELECTIVE-II)

Course Objectives:

- To understand the basic concepts of phase Controlled Induction Motor Drive
- To understand the concept of Voltage Source Inverter Fed Induction Motor Drive
- To design various Rotor Side Control of Slip-Ring Induction Motor
- To understand the concept of Control of Synchronous Motor Drives
- To understand the concept of PMSM and BLDC Drives.

UNIT-I

Phase Controlled Induction Motor Drive

Stator Voltage Control of Induction Motor, Phase-Controlled Converter Fed Induction Motor, Power Circuit and Gating, Reversible Phase-Controlled Induction Motor Drive, Torque-Speed Characteristics.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of Selection of control of AC motor drive
- To know about various characteristics of phase controlled drives
- To know about power circuit and gating configurations of converter
- To understand about reversible drive

UNIT-II:

Voltage Source Inverter Fed Induction Motor Drive

Stator Voltage and Frequency Control of Induction Motor, Torque-Speed Characteristic Static Frequency Changers, PWM Inverter Fed Induction Motor Drive, Variable-Voltage Variable-Frequency Operation of Induction Motor, Constant E/f And V/f Control Schemes, Slip Regulation.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of Variable-Frequency operation of Induction Motor
- To understand about variable-voltage, variable-frequency operation of Induction motor
- Understand the concept of Stator Voltage and Frequency Control of Induction Motor
- To understand about PWM fed IM drive

UNIT-III:

Rotor Side Control of Slip-Ring Induction Motor

Slip-Power Recovery Schemes, Steady-State Analysis- Range of Slip, Equivalent Circuit, Performance Characteristics; Rating of Converters.
Vector Control of Induction Motor:
Principles of Vector Control, Direct Vector Control, Indirect Vector Control, Implementation – Block Diagram, Estimation of Flux, Flux Weakening Operation.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of rotor side control Slip-Ring Induction Motor
- To know about performance characteristics
- To know about direct vector control of IM drive
- To know about indirect vector control of IM drive

UNIT-IV:

Control of Synchronous Motor Drives

Synchronous Motor - Control Strategies-Constant Torque Angle Control-Power Factor Control, Constant Flux Control, Flux Weakening Operation, Load Commutated Inverter Fed Synchronous Motor Drive, Motoring and Regeneration, Phasor Diagrams.

Learning Outcomes:-

After completion of this unit student will
- Understand Synchronous Motor Control Strategies
- Designing of Commutated Inverter Fed Synchronous Motor Drive
- To know about Motoring and Regeneration
- To understand phasor diagrams of Synchronous Motor Drive

Unit-V:
PMSM and BLDC Drives
Characteristics of Permanent Magnet, Synchronous Machines With Permanent Magnet, Vector Control of PMSM- Motor Model and Control Scheme, Constant Torque Angle Control, Constant Mutual Flux Linkages, Unity PF Control. Modelling of PM Brushless DC Motor, Drive Scheme, Commutation Torque Ripple, Phase Advancing.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of PMSM and BLDC Drives
- Design of motor model and control schemes of BLDC motors.
- To understand characteristics of PMSM
- To understand BLDC motor modelling aspects

Course Outcomes:

- Understand the basic concepts of AC Motor Drives.
- Modelling and analysis Stator Voltage and Frequency Control of Induction Motor, Torque-Speed Characteristic Static Frequency Changers, PWM Inverter Fed Induction Motor Drive.
- Design of speed control of induction motor from rotor end.
- Design and analysis of synchronous motor drives.
- Understand Design the concept of BLDC motor PMSM Motor

TEXT BOOK:
1. R. Krishnan, "Electric Motor Drives Modelling, Analysis & control", Pearson Education, 2001.
2. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Publications, 2001.

REFERENCE BOOKS:

1. MD Murphy & FG Turn Bull, "Power Electronics control of AC motors", 1st Edition, Pergaman press, 1998.
2. G.K. Dubey, "Fundamentals of Electrical Drives", Narosa Publications, 1995.
3. S. K. Pillai, "A First Course on Electrical Drives", New Age International, 1989.
4. Vedam Subrahmanyam, "Electric Drives: Concepts and Applications", 2nd Edition, Mc Graw Hill Education, 2017

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(10A02603c) ADVANCED CONTROL SYSTEMS
(PROFESSIONAL ELECTIVE -II)

Course Objectives:

This course introduces
- To give an overview of system analysis and design based on state space.
- Design of   state feedback control and observer.
- The properties of Nonlinearities.
- Stability analysis for linear and nonlinear systems.
- Design of optimal control problem.

UNIT – I

STATE VARIABLE DISCRIPTION

State space representation of systems – State diagrams for continuous time state models – Solution of state equations – State transmission matrix. controllability and observability for continuous time systems, Principle of Duality, Controllability and observability of state models in Jordan canonical form and other canonical forms – Numerical problems

Learning Outcomes:

At the end of the unit the student will be able to:
- Obtain the State Space Modelling for linear time-invariant systems.
- Know about controllability of a system
- Know about observability of a system
- To understand tests for controllability and observability of a given system.

UNIT – II

POLE PLACEMENT OBSERVER

Fundamental theorem of feedback control - Pole assignment by state feedback using Ackermann's formula – Eigen structure assignment problem-Design of full order observer using

Ackermann's formula. - Full order Observer based controller design. Reduced order observer design - Numerical problems

Learning Outcomes:

At the end of the unit the student will be able to:
- To know about design of pole assignment
- To know about state observer using state feedback
- To know about full order based controller design aspects
- To know about reduced order design aspects

UNIT – III

DESCRIBING FUNCTION AND PHASE-PLANE ANALYSIS

Introduction to nonlinear systems, Types of nonlinearities, Concepts of describing functions, describing functions for Dead zone, Saturation, backlash, relay with dead zone and Hysteresis - Jump Resonance.
Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, Singular points, Phase-plane analysis of nonlinear control systems – Numerical problems

Learning Outcomes:

At the end of the unit the student will be able to:
- Develop the describing function for the nonlinearity present to assess the stability of the system
- To understand about classification of describing functions
- To understand about construction of trajectories
- To know about Phase plane analysis of non-linear control systems

UNIT-IV

STABILITY ANALYSIS

Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems – Numerical problems.

Learning Outcomes:

At the end of the unit the student will be able to:

- To understand about Lyapunov stability
- Develop Lyapunov function for the stability analysis of nonlinear systems
- To understand Lyapunov instability theorems
- To understand and solve direct method of Lyapunov with numerical examples

UNIT –V

OPTIMAL CONTROL

Discrete time linear state regulator – Algorithm for the solution, Use of observer in implementing the control law. Continuous time linear state regulator – Matrix Riccati equation. Time invariant linear state regulator – the reduced matrix Riccati equation - An iterative method to solve the reduced matrix Riccati equation – Numerical problems

Learning Outcomes:

At the end of the unit the student will be able to get exposed to:
- Introduction to optimal control
- To know about discrete and continuous time linear state regulators
- To understand about Matrix Riccati equation
- To solve numerical problems using the above methods

Course Outcomes:

- To develop state variable models and its solution for various systems
- To understand and develop models for full order and reduced order based observers
- To know about describing function and analyse systems
- To understand about phase plane analysis of non-linear control systems
- To understand and develop models for Lyapunov's stability criterion
- To understand basic principles of optimal control and solving discrete and continuous linear state regulator systems

TEXT BOOKS:
1. M. Gopal, "Modern Control System Theory" 2nd edition, New Age International Publishers, 1996
2. K. Ogata, "Modern Control Engineering" 3rd edition, Prentice Hall of India, 1998

REFERENCE BOOKS:

1. M. Gopal, "Digital Control and State Variable Methods" Tata Mc Graw-Hill, 1997.
2. Gene F. Franklin, "Feedback Control of Dynamic Systems", 6th Edition, J.D. Powell, Pearson, 2010.
3. Stainslaw H. Zak , "Systems and Control", Oxford Press, 2003
4. N. K. Sinha, "Control Systems", 3rd Edition, New Age International, 2005.
5. by Graham C. Goodwin, "Control System Design", Stefan F. Graebe and Mario E. Salgado, Pearson, 2000

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B.Tech (EEE)– III-II Sem

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(19A04703c) EMBEDDED SYSTEMS
(Professional Elective III)

Course Objectives:
- To introduce major components of an embedded system
- To expose role of firmware, operating systems in correlation with hardware systems.
- To explain interfacing of various communication and I/O devices to an embedded system
- To demonstrate implementation of embedded systems for different applications

UNIT –I

Introduction to Embedded Systems: Definition of embedded system, embedded systems vs general computing systems, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, Processor and OS trends in embedded system.
Embedded hardware units and devices in a system, embedded software in a system and an overview of programming languages, skills required for an embedded system designer, examples of the embedded systems.

Learning Outcomes:-

After completion of this unit student will
- Differentiate embedded system and general computing system (L2)
- Classify embedded systems based on performance, complexity and era in which they are evolved (L4)
- Discuss basic hardware and software units used in embedded systems (L3)

UNIT –II

Core of the embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, Characteristics of an embedded system, Quality attributes of embedded systems.

Learning Outcomes:-

After completion of this unit student will
- Summarize different factors to be considered in the selection of memory for an embedded system (L2)
- Describe role of sensors, actuators and their interfacing with I/O subsystems(L2)

- Explain role of embedded firmware in embedded system (L2)
- Understand characteristics describing an embedded system (L2)
- Discuss important quality attributes of the embedded system for online and offline modes (L5)

UNIT- III

I/O, Communication devices and Interrupt Service Mechanism: I/O types and examples, serial communication devices, parallel device ports, wireless devices, timer and counting devices, Interrupt-driven input and output, interrupt service routine concept, interrupt sources, hardware interrupts, software interrupts, interrupt-servicing mechanism, multiple interrupts, interrupt service threads as second-level interrupt handlers, context and the periods for context switching, interrupt latency, interrupt-service deadline, interrupt service mechanism form context-saving angle, direct memory access driven I/O, Device driver programming.

Learning Outcomes:-

After completion of this unit student will
- Summarize pros and cons of interrupt driven data transfer (L2)
- Discuss hardware and software interrupts with examples (L3)
- Know how interrupts can be used to minimize latency (L3)
- Differentiate ISRs & device driver functions (L2)
- Describe uses of hardware and software assigned priorities in an interrupt service mechanism (L2)

UNIT –IV

Inter-process Communication (IPC): Multiple processes in an application, multiple threads in an application, tasks, task and thread states, tasks and data, distinction between function, ISR, IST and task by their characteristics, inter-process communication and synchronization, signals, concept of semaphores, disabling and enabling functions, shared data problem, queues and mailboxes, pipe and socket functions, remote procedure call functions.

Learning Outcomes:-

After completion of this unit student will
- Describe mechanism to create multiple tasks (processes & threads),control task states and allocate system resources to the tasks (L2)
- Explain IPC functions to enable communication of signals, semaphores and messages from ISRs and tasks (L2)
- Discuss IPC functions for pipes, sockets and RPCs (L3)

UNIT –V

REAL-TIMEOPERATING SYSTEMS - Operating System Overview, Operating System - Functions, Types and Services of Operating Systems, Real-Time Operating System, RTOS overview, RTOS Task Scheduling, Keil RTX RTOS, RTOS on **Mbed** platform, **Mbed**RTOSAPI, Using **Mbed** RTOS API for your Project, Thread, Mutex and Semaphore.

Learning Outcomes:-

After completion of this unit student will
- Explain about operating system and RTOS (L2)
- Summarize different features of RTOS (L2)
- Build RTOS based embedded system using Keil RTX mbed platform (L6)

Course Outcomes:

- Identify hardware and software components of an embedded system.
- Choose appropriate embedded system architecture for the given application.
- Discuss quality attributes and characteristics of an embedded system.
- Illustrate different Inter Process Communication (IPC) mechanisms used by tasks/process/tasks to communicate in multitasking environment.
- Design an RTOS based embedded system.

Text Books:

1. Shibu K V, "Introduction to Embedded Systems", 2nd edition, McGraw Hill Education,2017.
2. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", 3rd edition, McGraw Hill Education, 2017.

References:
1. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd edition, Pearson Education India, 2007
2. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", 3rdEdition Cengage Learning, 2012.
3. David. E. Simon, "An Embedded Software Primer" 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.

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B.Tech (EEE)– III-II Sem **L   T   P   C**

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(19A02603d)   WIND ENERGY SYSTEMS

(PROFESSIONAL ELECTIVE-II)

Course Objectives:

- To know about basics of alternate source as wind energy and its types
- To know about operations of FSIG
- To know about configuration of DFIG and its performance
- To know about configuration of FRC and its performance
- To know about integration of various other sources with wind farms

UNIT-I:

Fundamentals of Wind Energy Systems

Wind farms, Wind energy generating system, wind power, efficiency of wind energy, conversion, types, WEC devices, characteristics - Power Vs Speed and Torque Vs Speed, Control strategies – pitch angle control, stall control and yaw control

Learning Outcomes:-

After completion of this unit student will
- To understand about fundamental concepts of wind farms
- To know about various types of WES
- To know about calculation of wind power and efficiency
- To know about various characteristics of WES
- To understand about various basic control strategies of WES

UNIT-II:

Fixed Speed Induction Generator based Wind Turbines

Configuration, Two speed operation, variable slip operation, Modelling of FSIG, Dynamic performance, Small disturbances, Performance during network faults

Learning Outcomes:-

After completion of this unit student will

- To understand about FSIG as WTG and its configuration

- To know about basic operations of FSIG
- To understand about modelling of FSIG
- To know about performance of FSIG for small perturbations
- To understand about performance of FSIG for faults

UNIT-III:

DFIG based Wind Turbines

Configuration, Steady state characteristics, control strategies – control for optimum wind power extraction, current mode control, Rotor flux magnitude and angle control, dynamic performance, small disturbances, performance during network faults – Numerical problems

Learning Outcomes:-

After completion of this unit student will
- To understand about DFIG as WTG
- To know about various characteristics of DFIG
- To know about various control strategies of DFIG
- To know about performance of DFIG for small disturbances
- To understand about performance of DFIG during faults

UNIT-IV:

Variable Speed and FRC Wind Generators

Classification of schemes – operating area, Induction Generators – Cage rotor Induction Generator, Doubly fed Induction Generator, Wound-field Synchronous Generator, Permanent Magnet Generator.
FRC based Synchronous Generator - Direct driven FRC Synchronous Generator, Permanent Magnet Synchronous Generator, dynamic performance. FRC Induction Generator – Steady state performance, control, performance characteristics - Numerical problems

Learning Outcomes:-

After completion of this unit student will
- To understand about variable speed IGs as WTG
- To know about classification of DFIG for variable speed operation
- To understand about FRC based SG as WTG
- To know about permanent magnet SG
- To know about performance characteristics of various DFIGs

UNIT- V:

Integration of Wind Farms

Offshore wind farms, Onshore grid connection, Technical analysis, Hybrid Energy Systems – Wind-Diesel hybrid system with no storage and with battery backup, Wind-Photovoltaic systems – Numerical problems

Learning Outcomes:-

After completion of this unit student will
- To understand about the necessity of integration of wind farms with other sources
- To distinguish between offshore and onshore wind farms
- To know about integration of WES with diesel
- To integrate the system with and without storage backup
- To understand about integration of grid with PV systems

Course Outcomes:

1. To be able to distinguish between FSIG, VSIG, FRC as WES
2. To be able to understand which IG is to be selected based on the requirement
3. To be able to understand differences between various control strategies of different IGs
4. To be able to understand differences between various performance characteristics of different IGs
5. To know about integration of WES with other sources such as diesel, PV and their selection

TEXT BOOKS:

1. S.N. Bhadra, D, Kastha and S. Banerjee, "Wind Electrical Systems", 12th Impression, OXFORD University Press, 2013.
2. Olimpo Anaya-Lara, Nick Jenkins, Janaka Ekanayake, "Wind Energy Generation: Modelling and Control Phill Cartwright and Mike Hughes", WILEY, 2009.

REFERENCES:

1. Mukund R. Patel, "Wind and Solar Power Systems: Design, Analysis and Operation" 2nd Edition, Taylor & Francis, 2006.
2. N.K. Bansal, "Renewable Energy Sources & Conversion Technology Manfred Kleemann and Michael Meliss", Tata Mc Graw Hill, 1990.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE) – III-II   **L   T   P   C**
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(19A01604a) INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT
OPEN ELECTIVE-II

Course Objectives:

- To teach Health and Environment Concerns in waste water management
- To teach material balance and design aspects of the reactors used in waste water treatment.
- To impart knowledge on selection of treatment methods for industrial waste water
- To teach common methods of treatment in different industries
- To provide knowledge on operational problems of common effluent treatment plant

UNIT –I

Industrial water Quantity and Quality requirements:
Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills Selection of source based on quality, quantity and economics. Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

Learning Outcomes:

At the end of the unit, students will be able to:
- Learn the procedures for assessment of quality of Industrial water
- Suggest different processes of handling waste water

UNIT –II

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

Learning Outcomes:

At the end of the unit, students will be able to:
- Measure industrial waste water flow
- Characterize waste water
- Suggest techniques for treatment of waste water.

UNIT –III

Industrial wastewater disposal management: Discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

Learning Outcomes:

At the end of the unit, students will be able to:
- Understand options for waste water disposal.
- Explain functioning of common effluent treatment plants

UNIT – IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants

Learning Outcomes:

At the end of the unit, students will be able to:
- Understand the character of waste water from Steel plants and refineries
- Suggest suitable waste water treatment techniques

UNIT – V

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants

Learning Outcomes:

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

- Understand the character of waste water from tanneries and distilleries
- Suggest suitable waste water treatment techniques

Course Outcomes:

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

● Design treatment methods for any industrial wastewater.

● Examine the manufacturing process of various industries.

● Assess need for common effluent treatment plant for an industry

● Test and analyze BOD, COD, TSS and MPN in waste water.

TEXT BOOK

    1. M. N. Rao and A. K. Dutta, "Wastewater Treatment", Oxford & IBH, New Delhi.

    2. K.V. S. G. Murali Krishna, "Industrial Water and Wastewater Management".

REFERENCES

    1. A. D. Patwardhan, "Industrial Wastewater treatment", PHI Learning, Delhi

    2.Metcalf and Eddy Inc., "Wastewater Engineering", Tata McGraw Hill co., New Delhi.

    3.G. L. Karia & R.A. "Christian Wastewater Treatment- Concepts and Design Approach", Prentice Hall of India.

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B.Tech (EEE)– III-II   **L   T   P   C**
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(19A01604b) BUILDING SERVICES AND MAINTAINANCE
OPEN ELECTIVE-II

Course Objectives:

- To impart knowledge in concepts of building maintenance
- To insists the student to observe various practices of good building maintenance
- To teach the importance safety in buildings
- To demonstrate the use of ventilation in buildings.
- To give the list of different types of machineries in buildings

UNIT – I

PLUMBING SERVICES: Water supply system- fixing of pipes in buildings – maintenance of buildings- water meters-sanitary fittings-design of building drainage- gas supply systems

Learning Outcomes:

At the end of the unit, students will be able to:
- Understand water supply system
- Understand the building drainage system.

UNIT – II

VENTILATION: Necessity of ventilation – functional requirements – systems of ventilation-natural ventilation-artificial ventilation-air conditioning-systems of air conditioning-essentials of air conditioning-protection against fire caused by air conditioning systems.

Learning Outcomes:

At the end of the unit, students will be able to:
- Understand concepts of ventilation
- Understand concepts of air conditioning

UNIT – III

THERMAL INSULATION: Heat transfer system-thermal insulating materials-methods of thermal insulation-economics of thermal insulation-thermal insulation of exposed walls, doors,windows and roofs.

Learning Outcomes:

At the end of the unit, students will be able to:
- Understand methods of insulation
- Understand materials of insulation

UNIT – IV

FIRE SAFETY: Causes of fire in buildings-fire safety regulations-charecteristics of fire resisting materials- fire resistant construction-heat and smoke detecters-fire alarms-fire fighting pump and water storage.

Learning Outcomes:

At the end of the unit, students will be able to:
- Understand safety regulations of fire system
- Know about the implementation and usage of various fire resistant materials in building construction

UNIT – V

MACHINERIES IN BUILDINGS: Lifts-essential requirements-design considerations-escalators-essential requirements-electrical installations in buildings-lighting in buildings-methods of electrical wiring-earthing

Learning Outcomes:

At the end of the unit, students will be able to:
- Understanding of different machineries of buildings
- Understanding of electrical installation of buildings

Course Outcomes:

Student will be able to understand
- Concepts of plumbing, drainage system and gas supply system
- Concepts of ventilation and air conditioning
- Concepts of thermal insulation and economics of thermal insulation
- Concepts of fire safety in buildings and fire resistant construction
- Concepts of different machineries of buildings

TEXT BOOKS:

1. B.C.Punmia, Er. Ashok K jain, Arun K Jain "Building construction", Laxmi publications pvt.ltd. New Delhi.
2. Janardhan Jah, S.K Sinha, "Building construction", Khanna publishers
3. Rangwala, "Building construction", Charothar publishing house.

REFERENCE BOOKS:

1. David V Chaddrton, "Building services engineering", Outledge
2. P.C Varghees "Building construction", Printice hall india

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B.Tech (EEE)– III-II Sem   **L   T   P   C**
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(19A02604a) INDUSTRIAL AUTOMATION
OPEN ELECTIVE-II

Course Objectives:

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I:

Introduction to Automation

Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:

At the end of the unit, students will be able to:
- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II:

Mechanization and Automation

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital- intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc. Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:

At the end of the unit, students will be able to:
- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts
- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

UNIT -III:

Pneumatics and hydraulics

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)–pneumatic, electro pneumatics and hydraulics. Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:

At the end of the unit, students will be able to:
- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
- To understand about electro pneumatic circuits
- To design using various solenoid valves with and without grouping

UNIT -IV:

Sensors & Actuators Sensors

Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors (5) BLDC

Learning Outcomes:

At the end of the unit, students will be able to:
- To know about selection of sensors and actuators based on dynamic characteristics
- To understand about necessity of interfacing sensors with Microcontroller
- To understand principle and selection of actuators
- To apply various electro mechanical actuators to certain machines

UNIT- V:

Robots and their applications

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:

At the end of the unit, students will be able to:
- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot
- To understand how adaptive control strategies can be used in Robots

Course Outcomes:

6. Understand the basic concepts of Industrial automation
7. Design and analysis of automation methods, placing and assembling of various parts
8. Design of various processing and control circuits using pneumatic and hydraulic elements
9. Selection of sensors based on the industrial application
10. Role of robotics in industrial applications

TEXT BOOKS:

3. Stamatios Manesis and George Nikolakopoulos, "Introduction to Industrial Automation", CRC Press, 2018.
4. Frank Lamb, "Industrial Automation", Hands on, Mc Graw Hill Education, 2013.

REFERENCES:

3. Richerd L. Shell and Ernest L. Hall, "Hand Book of Industrial Automation", CRC Press, 2000.

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(19A02604b) SYSTEM RELIABILITY CONCEPTS
(OPEN ELECTIVE-II)

Course Objectives:

To make the students learn about:
- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

UNIT-I:

Basic Probability Theory

Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples

Learning Outcomes:

At the end of the unit, students will be able to:
- To know about basic rules for probabilities of events
- To distinguish between pdf and cdf
- Get detailed information about Probability of failure density and distribution functions
- Obtain the expected value and standard deviation for binomial distribution.

UNIT-II:

Network Modeling and Reliability Evaluation

Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

Learning Outcomes:

At the end of the unit, students will be able to:
- How to find the Probability of success and failures of network using different approaches for series-parallel configurations.
- Classification of redundancies.
- To find reliability / unreliability of complex systems using different methods
- Comparison of approaches to solve probability index of SISO system

UNIT-III:

Time Dependent Probability

Basic concepts – Reliability functions f(t), Q(t), R(t), h(t) – Relationship between these functions – Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF – Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to
- Understand the concepts of time domain functions and relationship between them.
- Obtain the expected value and standard deviation for exponential distribution.
- Obtain the values of probabilistic measures for series and parallel configurations.
- To obtain probabilistic measures for fully redundant and partially redundant configurations

UNIT-IV:

Discrete Markov Chains & Continuous Markov Processes

Markov Chains: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.
Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability
- To know about evaluation for one and two component repairable models.
- Understand the concept of Frequency balance approach.
- To distinguish between Markov chains and Markov processes

UNIT-V:

Multi Component & Approximate System Reliability Evaluation

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and 'n' component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates.
- Obtain the cumulative probability and cumulative frequency for different systems
- To know about computation of basic probability indices for series, parallel configurations
- To know how to evaluate basic probability indices using cut set approach

Course Outcomes:

After completing the course, the student should be able to do the following:

- Understand the concepts for combining Probabilities of events, Bernoulli's trial, and Binomial distribution.
- Network Reliability/Unreliability using conditional probability, path and cutset based approach, complete event tree and reduced event tree methods.
- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities.
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach.
- Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and 'n' component repairable model.

Text Books:

1. Roy Billinton and Ronald N. Allan, "Reliability Evaluation of Engineering Systems", Reprinted in India B. S. Publications, 2007.
2. E. Balagurusamy, "Reliability Engineering", Tata McGraw Hill, 2003.

Reference Books:

1. E. E. Lewis , "Introduction to Reliability Engineering" Wiley Publications.
2. Charles E. Ebeling, "Reliability and Maintainability Engineering", Tata McGraw Hill, 2000.
3. by Ajit Kumar Verma, Srividya Ajit and Durga Rao Karanki, Springer, "Reliability and Safety Engineering" 2nd edition, 2016.
4. Rausand and Arnljot Hoyland, "System Reliability Theory Marvin", Wiley Publictions.

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B.Tech (EEE)– III-II Sem　　　　　　　　　　　　　　　**L　T　P　C**
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(19A03604a) INTRODUCTION TO MECHATRONICS
OPEN ELECTIVE

Course Objectives:

- Familiarize the technologies behind modern mechatronic systems.
- Explain fundamentals for the development of fully automated system.
- Develop a robotic or automated systems focusing on the hardware and software integration.
- Demonstrate the development and design of mechatronic system and MEMS.

UNIT – I

Introduction: Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

Learning Outcomes:

At the end of the unit, the student will be able to
- Explain the role of mechatronics in industry.(l2)
- Identify the application of mechatronics in automation industry.(l3)

UNIT – II

Sensors: Static characteristics of sensors, Displacement, Position and Proximity sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

Learning Outcomes:

At the end of the unit, the student will be able to
- Classify various types of sensors. (l2)
- Choose sensors for particular application. (l3)
- Measure different quantity's using sensors. (l4)

UNIT – III

Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

Learning Outcomes:

At the end of the unit, the student will be able to
- Classify various actuation systems. (l2)
- Choose the criterion for different actuators. (l1)

UNIT – IV

Microprocessors, Microcontrollers and Programmable Logic Controllers: Architecture of of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of controllers.

Learning Outcomes:

At the end of the unit, the student will be able to
- Understand the architecture of microprocessors, microcontrollers and PLC. (L2)
- Formulate various programs using PLC. (L6)

UNIT – V

Design of mechotronics systems**,** Mechotronics design elements, Traditional mechatronics systems, Embedded systems, Procedure for designing a mechotronic systems.

Learning Outcomes:

At the end of the unit, the student will be able to
- Understanding design of mechotronics . (L2)
- Various Mechotronics systems. (L4)
- Design Aspects of Mechotronic systems. (L2)

Course Outcomes

Upon successful completion of this unit, the student will be able to:
- Explain mechatronics systems in industry. (l2)
- Identify mechatronic systems encountered in practice. (l3)
- Examine the components of a typical mechatronic system. (l4)
- Compare the various techniques used for development of mems. (l4)
- Develop programs using plc. (l6)

Text books:

1. Er R. Rajput, " A Text book of Mechatronics", S.Chand,2nd edition-2016.
2. James J Allen, "Micro Electro Mechanical Systems Design", CRC Press Taylor & Francis group, 2005.

Reference Text books:

1. WBolton, "Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering", 3rd edition, Pearson Education Press, 2005.
2. Devadas Shetty and Richard A Kolk, "Mechatronic System Design", 2nd edition, Cengage learning, 2010.
3. Clarence W. de Silva, "Mechatronics an Integrated Approach", CRC Press, 2004.
4. Ganesh S Hedge, "Mechatronics", Jones & Bartlett Learning, 2010.

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(19A03604b) OPTIMIZATION TECHNIQUES THROUGH MATLAB
OPEN ELECTIVE-II

Course Objectives

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I

Introduction to MAT LAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

Learning Outcomes:

After completion of this unit, students will be able to
- Write simple codes in MATLAB. (L3)
- Plot the data using MATLAB. (L3)
- Implement optimization models in MATLAB. (L3)

UNIT -II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

Learning Outcomes:

After completion of this unit, students will be able to
- Build optimization problem. (l1)
- Solve various optimization problems(l3)
- Compare convex and concave programming (l4)

UNIT -III

Single Variable Optimization: Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to
- Understand various methods involving single variable optimization. (l2)
- Develop codes in matlab for different methods. (l3)
- Identify methods for solving a single variable optimization problem. (l3)

UNIT- IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to
- Apply various methods involving multi variable optimization. (l2)
- Develop codes in matlab for solving various multi variable optimization problems. (l3)
- Choose methods for solving a multi variable optimization problem. (l3)

UNIT -V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Learning Outcomes:

After completion of this unit, students will be able to
- Apply different types of genetic algorithms. (l3)
- Model optimization problems using genetic algorithms in matlab. (l3)
- Compare different genetic algorithms for performance. (l5)

Course Outcomes:

After completion of this course the student can be able to
- Use optimization terminology and concepts, and understand how to classify an optimization problem.(l4)
- Apply optimization methods to engineering problems.(l3)
- Implement optimization algorithms.(l3)
- Compare different genetic algorithms. (l5)
- Solve multivariable optimization problems. (l4)

TEXT BOOKS:

1. Rao V.Dukkipati, MATLAB: "An Introduction with Applications", Anshan, 2010.
2. Achille Messac, "Optimization in practice with MATLAB", Cambridge University Press, 2015.
3. Jasbir S Arora, "Introduction to optimum design", 2nd edition. Elsevier, 2004.

REFERENCES:

1. Cesar Perez Lopez, "MATLAB Optimization Techniques", Academic press, Springer publications, 2014.
2. Steven C.Chapra, "Applied Numerical Methods with MATLAB for Engineers and scientists": 4th edition, McGraw-Hill Education, 2018.

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B.Tech (EEE)– III-II Sem   **L   T   P   C**
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(19A04604a)   BASICS OF VLSI
OPEN ELECTIVE-II

Course Objectives:

The objectives of the course are to
- Learn and Understand IC Fabrication process steps required for various MOS circuits
- Understand and Experience VLSI Design Flow
- Learn Transistor-Level CMOS Logic Design
- Understand VLSI Fabrication and Experience CMOS Physical Design
- Learn to Analyze Gate Function and Timing Characteristics

UNIT – I

Introduction: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOStechnologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ionimplantation, Metallization and Encapsulation.

Basic Electrical Properties: Basic Electrical Properties of MOS,CMOS and BiCMOS Circuits, I_{DS}-V_{DS}relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit ω_o, Passtransistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio (Z_{pu} / Z_{pd}) , CMOS Inverter analysis and design, BiCMOS inverters,Latch-up in CMOS circuits.

Learning Outcomes:

After completion of this unit, students will be able to

- Demonstrate a clear understanding of CMOS fabrication flow and technology scaling (L2)
- Analyze the electrical properties of MOS and BiCMOS circuits (L3)
- Design MOSFET based logic circuit (L4)

UNIT – II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts,Lambda based design rules, Contact cuts , CMOS Lambda based design rules,Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling ofMOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand the design rules and layout diagram for logic gates, limitations of scaling (L1)
- Draw the Layout of simple MOS circuit using Lambda based design rules (L2)

UNIT – III

Gate Level Design and Layout: Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit:Pseudo-NMOS Dynamic CMOS logic. Basic circuit concepts, Sheet ResistanceR_S and its concept to MOS, Area Capacitance Units, Calculations, The delay unit$T$, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-inand fan-out, Choice of layers

Learning Outcomes:

After completion of this unit, students will be able to

- Apply basic circuit concepts to MOS circuits. (L2)
- Estimate the propagation delays in CMOS circuits (L3).

UNIT – IV

Subsystem Design: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, SerialParallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/DownCounter, Memory elements: SRAM, DRAM, ROM, Serial Access Memories.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply the Lambda based design rules for subsystem design (L2)
- Design of Adders, Multipliers and memories etc(L4)
- Design digital systems using MOS circuits(L4)

UNIT – V

Semiconductor Integrated Circuit Design:PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic,Programmable Logic Array Design Approach.

Learning Outcomes:

After completion of this unit, students will be able to
- Analyze various architectures and device technologies of PLDs(L3)
- Design simple logic circuit using PLA, PAL, FPGA and CPLD.(L4)

Course Outcomes:

- Learn the basic fabrication process of MOS transistors, study CMOS inverter circuits, basic circuit concepts such as Sheet Resistance, Area Capacitance and Delay calculation, Field programmable gate arrays and realization techniques, CPLDs and FPGAs for implementing the various logic functions.

- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality.

- Analyze the performance of CMOS Inverter circuits

- Compare various Scaling models and understand the effect of scaling on device parameters

TEXT BOOKS:

1. Kamran Eshraghian, "Essentials of VLSI circuits and systems", EshraghianDouglesand A. Pucknell, PHI, 2005 Edition
2. Wayne Wolf, "Modern VLSI Design", 3rd Edition, Pearson Education, 1997.

REFERENCE BOOKS:

1. John .P. Uyemura, "CMOS logic circuit Design", Springer, 2007.
2. Neil H. E Weste, "CMOS VLSI Design – A Circuits and Systems Perspective", 3rd edition, DavidHarris, Ayan Banerjee, Pearson, 2009.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)– III-II Sem

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(19A04604b) PRINCIPLES OF COMMUNICATION SYSTEMS
OPEN ELECTIVE-II

Course Objectives:

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyse various modulation schemes.
- To evaluate various modulation scheme in real time applications.

UNIT-I:

Amplitude Modulation

Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB. Frequency Division Multiplexing. Radio Transmitter and Receiver.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the concept of noise, Fourier transform, career modulation and frequency division multiplexing (L1).
- Apply the concept of amplitude modulationto solve engineering problems (L2).
- Analyse various amplitude modulation schemes (L3).
- Evaluate various amplitude modulation schemes in real time applications (L3).

UNIT-II:

Angle Modulation

Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the concept of angle modulation and its components (L1).

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- Apply the concept of frequency modulation to solve engineering problems (L2).
- Analyse angle modulation schemes (L3).
- Evaluate frequency modulation scheme in real time applications (L3).

UNIT-III:

Pulse Modulation

Sampling Theorem: Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the concept of various pulse modulation schemes and time division multiplexing (L1).
- Analyse various pulse modulation schemes (L3).

UNIT-IV:

Digital Modulation

Binary Amplitude Shift Keying, Binary Phase Shift Keying and QuadraturePhase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater.

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the concept of various digital modulation schemes (L1).
- Analyze various digital modulation schemes (L3).

UNIT-V:

Communication Systems
Satellite, RADAR, Optical, Mobile and Computer Communication (Block diagram approach only).

Learning Outcomes:

At the end of the unit, the student should be able to
- Understand the concept of various communication systems (L1).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

- Understand the concept of various modulation schemes and multiplexing (L1).
- Apply the concept of various modulation schemes to solve engineering problems (L2).
- Analyse various modulation schemes, and evaluate various modulation scheme in real time applications (L3).

TEXT BOOKS:

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3rdEdition, Tata McGraw-Hill Publishing Company Ltd., 2008.

REFERENCES:
1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", Wiley India Edition, 2008.

Blooms' Learning levels:
L1: Remembering and Understanding
L2: Applying
L3: Analyzing, Evaluating

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(19A05604a) FUNDAMENTALS OF VR/AR/MR
Open Elective-II
(Common to CSE & IT)

Course Objectives:

This course is designed to:
- Explore the history of spatial computing and design interactions
- Understand the foundational principles describing how hardware, computer vision algorithms function
- Learn Virtual reality animation and 3D Art optimization
- Demonstrate Virtual reality
- Introduce to the design of visualization tools

UNIT-I

How Humans interact with Computers: Common term definition, introduction, modalities through the ages (pre- 20th century, through world war-II, post world war-II, the rise of personal computing, computer miniaturization), why did we just go over all of this?, types of common HCI modalities, new modalities, the current state of modalities for spatial computing devices, current controllers for immersive computing systems, a note on hand tracking and hand pose recognition.

Designing for our Senses, Not our Devices: Envisioning a future, sensory technology explained, who are we building this future for?, sensory design, five sensory principles, Adobe's AR story.

Learning Outcomes:

At the end of the unit, students will be able to:
- Explain common modalities and their pros and cons.(L2)
- Demonstrate Mapping modalities to current industry inputs(L2)
- Explore the importance of design with spatial computing(L5)

UNIT-II

Virtual Reality for Art: A more natural way of making 3D art, VR for animation.

3D art optimization: Introduction, draw calls, using VR tools for creating 3D art, acquiring 3D models vs making them from scratch.

How the computer vision that makes augmented reality possible works: Who are we?, a brief history of AR, how and why to select an AR platform, mapping, platforms, other development considerations, the AR cloud.

Learning Outcomes:

At the end of the unit, students will be able to:
- Utilize VR tools for creating 3D Animations(L3)

- Analyze how and why to Select an AR Platform(L4)

UNIT-III

Virtual reality and augmented reality: cross platform theory: Why cross platform? The role of game engines, understanding 3D graphics, portabiltity lessons from video game design, simplifying the controller input.

Virtual reality toolkit: open source framework for the community: What is VRTK and why people use it?, the history of VRTK, welcome to the steam VR unity toolkit, VRTK v4, the future of VRTK, success of VRTK.

Three virtual reality and augmented reality development practices: Developing for virtual reality and augmented reality, handling locomotion, effective use of audio, common interaction paradigms.

Learning Outcomes:

At the end of the unit, students will be able to:
- Explain why the design approach should be considered at a holistic high level based on the goal of the experience(L2)
- Build VR solutions using Virtual reality toolkit(L6)
- Interpret the development practices in three Virtual reality and Augmented reality development(L2)

UNIT-IV

Data and machine learning visualization design and development in spatial computing: Introduction, understanding data visualization, principles for data and machine learning visualization design and development in spatial computing, why data and machine learning visualization works in spatial computing, 2D data visualization vs 3D data visualization in spatial computing, interactivity in data visualizations and in spatial computing, animation, failures in data visualization, good data visualization design optimize 3D spaces, data representations, info graphics, and interactions, defining distinctions in data visualization and big data for machine, how to create data visualization: data visualization creation pipeline, webXR, data visualization challenges in XR, data visualization industry use case examples of data visualization, 3D reconstruction and direct manipulation of real world data, data visualization is for everyone, hands on tutorials, how to create data visualization, resources.

Learning Outcomes:

At the end of the unit, students will be able to:
- Understand, define, and set data and machine visualization design and development principles in embodied reality(L1)
- Demonstrate best practices, and practical tools to create beautiful and functional data visualizations.(L2)

UNIT-V

Character AI and Behaviors: Introduction, behaviors, current practice: Reactive AI, more intelligence in the system, Deliberative AI, machine learning.

The virtual and augmented reality health technology ecosystem: VR/AR health technology application design, standard UX isn't intuitive, tutorial: insight Parkinson's experiment, companies, case studies from leading Academic institutions.

Learning Outcomes:

At the end of the unit, students will be able to:
- Design a behavioral AI system for a video game(L6)
- Identify issues related to design of virtual reality (VR) and augmented reality (AR) experiences deployed in a health-care context(L3)
- Explain the use of motion data from controllers to reduce the visible tremor of a Parkinson's patient in a virtual environment(L2)

Course outcomes
Upon completion of the course, the students should be able to:

- Explain how the humans interact with computers (L2)
- Apply technical and creative approaches to make successful applications and experiences. (L3)
- Design audio and video interaction paradigms (L6)
- Design Data visualization tools (L6)
- Apply VR/MR/AR in various fields in industry (L3)

Text book
1. Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented & Virtual Realities", 1st edition, O'REILLY, 2019.

References
1. Steve Aukstakalnis, "Practical Augmented Reality", Pearson Education, 2017.

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(19A05604b) DATA SCIENCE
Open Elective-II
(Common to CSE & IT)

Course Objectives

This course is designed to:
- Understand the approaches for handling data related problems
- Explore the mathematical concepts required for Data science
- Explain the basic concepts of data science.
- Elucidate various Machine Learning algorithms.
- Introduce Natural Language Processing and Recommender Systems

UNIT- I

Introduction to Data Science, A Crash Course in Python, Visualising Data.

Learning Outcomes:

At the end of the unit, students will be able to:
- Describe the importance of data analysis (L1).
- Identify the key connectors of Data Science (L4).
- Interpret and Visualize the data using bar charts, line charts and scatter plots (L3).

UNIT-II

Linear Algebra, Statistics, Probability, Hypothesis and Inference, Gradient Descent.

Learning Outcomes:

At the end of the unit, students will be able to:
- Identify the Correlation between two vectors (L4).
- Test a given hypothesis (L3).
- Compute mean, median and mode for the given data (L3).

UNIT-III

Getting Data, Working with Data, Machine Leaning, k-Nearest Neighbors, Naïve Bayes.

Learning Outcomes:

At the end of the unit, students will be able to:
- Compute dimensionality reduction using PCA (L3).
- Differentiate supervised and unsupervised learning methods (L4).
- Describe overfitting, under fitting, bias, variance and goodness of learning (L1).
- Solve classification problem using k-nearest neighbour classifier (L3).
- Apply Naïve Bayes classifier to solve decision making problem (L3).

UNIT-IV

Simple Linear Regression, Multiple Regression, Logistic Regression, Decision Trees, Neural Networks.

Learning Outcomes:

At the end of the unit, students will be able to:
- Describe gradient descent approach, maximum likelihood estimation and method of least squares (L1).
- Apply SVM to determine a hyperplane with maximum margin (L3).
- Determine decision tree for given data (L5).
- Describe Perceptron and Back Propagation (L3).

UNIT-V

Clustering, Natural Language Processing, Network Analysis, Recommender Systems.

Database and SQL, MapReduce

Learning Outcomes:

At the end of the unit, students will be able to:
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L5).
- Apply basic SQL Operations using NotQuiteABase (L3).
- Compare User-Based and Item-Based Collaborative Filtering (L2).
- Describe Grammer and MapReduce (L1).

Course Outcomes:

After completion of this course the student would be able to

- Visualize the data using bar charts, line charts and scatter plots (L4).
- Analyse Correlation between two data objects (L4).
- Demonstrate feature selection and dimensionality reduction.(L2)
- Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision. Trees (L3).
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L3).
- Design basic SQL Operations using NotQuiteABase (L6)
- Demonstrate the way to use machine learning algorithms using python. (L2)

Text Books:

1. Data Science from Scratch, First Principles with Python - Joel Grus, O'Reilly, First Edition.

Reference Books:

1. The Data Science Handbook, Field Cady, WILEY.
2. An Introduction to Data Science, Jeffrey M. Stanton, Jeffrey Stanton, 2012

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(19A27604a)   FOOD TOXICOLOGY
OPEN ELECTIVE II

PREAMBLE

This text covers about toxins and their relation in food. Examination, identification and prevention of toxins.

Course Objectives

- To know the various toxins and their evaluation.
- To understand their tolerance and control measures.

UNIT – I

Principles of Toxicology: classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity: risk vs. benefit: experimental design and evaluation: prospective and retrospective studies: Controls :Statistics (descriptive, inferential): animal models as predictors of human toxicity: Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitvo studies; clinical trials.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Classification of toxic agents; characteristics of exposure;
- Spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity.
- Evaluation of toxicity: risk vs. benefit: experimental design and evaluation:
- Prospective and retrospective studies: Controls: Statistics (descriptive, inferential): animal models as predictors of human toxicity:
- Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitvo studies; clinical trials.

UNIT – II

Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins), natural occurrence, toxicity and significance, determination of toxicants in foods and their management.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin
- Microbial toxins (e.g., bacterial toxins, fungal toxins and algal toxins), natural occurrence, toxicity and significance
- Determination of toxicants in foods and their management

UNIT – III

Food allergies and sensitivities: natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); Safety of genetically modified food: potential toxicity and allergenisity of GM foods. Safety of children consumables.

Learning outcomes:

At the end of unit, students will be able to understand the following
- Natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies
- Food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions)
- Potential toxicity and allergenisity of gm foods. Safety of children consumables.

UNIT – IV

Environmental contaminants and drug residues in food: fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite green in fish and β- agonists in pork); other contaminants in food, radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Fungicide and pesticide residues in foods; heavy metal and their health impacts
- Use of veterinary drugs (e.g. Malachite green in fish and β- agonists in pork); other contaminants in food, radioactive contamination of food
- Food adulteration and potential toxicity of food adulterants.

UNIT – V

Food additives and toxicants added or formed during food processing: safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso-compounds, heterocyclic amines, dietary Supplements and toxicity related to dose: common dietary supplements; relevance of the dose; possible toxic effects.

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Safety of food additives; toxicological evaluation of food additives;
- Nitroso-compounds, heterocyclic amines, dietary supplements and toxicity related to dose
- Common dietary supplements; relevance of the dose; possible toxic effects.

Course Outcomes

By the end of course
- Student will gain knowledge on principles of toxicity and characteristics of toxins and their classification. Examination and prevention of toxins in foods and etc.

TEXT BOOKS

1. Helferich, W., and Winter, C.K "Food Toxicology",. CRC Press, LLC. Boca Raton, FL. 2007.
2. Shibamoto, T., and Bjeldanes, L. "Introduction to Food Toxicology", 2009, 2nd Edition. Elsevier Inc., Burlington, MA.
3. Watson, D.H. "Natural Toxicants in Food", CRC Press, LLC. Boca Raton, FL1998.

REFERENCES
1. Duffus, J.H., and Worth, H.G. J. "Fundamental Toxicology", The Royal Society of Chemistry. 2006.
2. Stine, K.E., and Brown, T.M. "Principles of Toxicology", 2nd Edition. CRC Press. 2006.
3. Tönu, P. "Principles of Food Toxicology". CRC Press, LLC. Boca Raton, FL. 2007.

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(19A27604b)   FOOD PLANT EQUIPMENT DESIGN
OPEN ELECTIVE - II

PREAMBLE

This text focuses on materials used for food plant equipment and factors considered for design of various equipment.

Course Objectives:

- To understand the material properties and codes used.
- To know the design considerations.
- To study the design of evaporators, dryers, crystallizers and etc.

UNIT – I

Materials and properties: Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings, corrosion prevention linings equipment, choice of materials, material codes. Design considerations: Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor, temperature effects, radiation effects, effects of fabrication method, economic considerations

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings
- Corrosion prevention linings equipment, choice of materials, material codes
- Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor
- Temperature effects, radiation effects, effects of fabrication method, economic considerations

UNIT – II
Design of pressure and storage vessels: Operating conditions, design conditions and stress; Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories. Design of heat exchangers: Design of shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Design of pressure and storage vessels includes operating conditions, design conditions and stress
- Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories
- Design of heat exchangers like shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

UNIT – III

Design of evaporators and crystallizers: Design of single effect and multiple effect evaporators and its components; Design of rising film and falling film evaporators and feeding arrangements for evaporators; Design of crystallizer and entrainment separator

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Design of evaporators like single effect and multiple effect evaporators and its components; rising film and falling film evaporators and feeding arrangements for evaporators;
- Design of crystallizer and entrainment separator

UNIT – IV

Design of agitators and separators: Design of agitators and baffles; Design of agitation system components and drive for agitation. Design of centrifuge separator; Design of equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems. Design of freezing equipment: Design of ice-ream freezers and refrigerated display system

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Design of agitators and baffles like Design of agitation system components and drive for agitation.
- Design of centrifuge separator like equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems.
- Design of freezing equipment like ice-ream freezers and refrigerated display system

UNIT – V

Design of dryers: Design of tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer. Design of extruders: Cold and hot extruder design, design of screw and barrel, design of twin screw extruder. Design of fermenters: Design of fermenter vessel, design problems

Learning Outcomes:

At the end of unit, students will be able to understand the following
- Design of dryers like tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer
- Design of extruders like Cold and hot extruder design, design of screw and barrel, design of twin screw extruder.
- Design of fermenter vessel, design problems

Course Outcomes

By the end of the course, the students will
- acquires knowledge on theoretical aspects to be design considerations for a food plant equipment and designing of evaporators, separators, storage vessels and etc.

TEXT BOOKS

1. Antonio Lopez-Gomez, Gustavo V. Barbosa-Canovas, "Food plant design", CRC press 2005.
2. George D. Saravacos and Zacharias B. Maroulis, "Food Plant Economics", CRC Press 2007.

REFERENCES

1. Peters M., Timmerhaus K. & Ronald W., "Plant Design & Economics for Chemical Engineers", McGraw Hill.
2. James R Couper, "Process Engg. Economics (Chemical Industries) CRC Press 3. Aries & Newton, Chemical Engg. Cost Estimation", McGraw Hill.

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(19A54604a) WAVELET TRANSFORMS AND ITS APPLICATIONS

OPEN ELECTIVE-II

Course Objective:

This course provides the students to understand Wavelet transforms and its applications.

UNIT-I-

Wavelets

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets -effectiveness of Wavelet Analysis -The Discrete Wavelet Transform The Discrete-Time and Continuous Wavelet Transforms.

Learning Outcomes:

Students will be able to
- Understand wavelets and wavelet expansion systems.
- Find wavelet transforms in continuous as well as discrete domains.

UNIT-II-

A Multiresolution Formulation of Wavelet Systems

Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

Learning Outcomes:

Students will be able to
- Illustrate the multi resolution analysis, scaling function.
- Implement parseval theorem.

UNIT-III-

Filter Banks and the Discrete Wavelet Transform : Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - - Different Points of View.

Learning Outcomes:

Students will be able to
- Form fine scale to coarse scale analysis.
- Perform decimating synthesis.
- Find the lattices and lifting.

UNIT-IV

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

Learning Outcomes:

Students will be able to
- Perform multi resolution versus time frequency analysis.
- Perform numerical complexity of discrete wavelet transforms.

UNIT-V

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

Learning Outcomes:

Students will be able to
- Understand the orthogonal bases and Biorthogonal Bases.
- Find the Frames and Tight Frames using Fourier series.

Course Outcomes:

After the completion of course, students will be able to

- Understand wavelets and wavelet expansion systems.
- Illustrate the multi resolution analysis ad scaling functions.
- Form fine scale to coarse scale analysis.
- Find the lattices and lifting.
- Perform numerical complexity of discrete wavelet transforms.
- Find the frames and tight frames using fourier series.

TEXT BOOKS:

1. C. Sidney Burrus, Ramesh A. Gopinath, "Introduction to Wavelets and Wavelets Transforms",Prentice Hall, (1997).
2. James S. Walker, "A Primer on Wavelets and their Scientific Applications", CRC Press, (1999).

REFERENCE BOOKS:

1. Raghuveer Rao, "Wavelet Transforms", Pearson Education, Asia.

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(19A52604a)   SOFT SKILLS
(OPEN ELECTIVE-II)

Course Objectives

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize soft skills
- To develop Time management, Positive thinking & Decision making skills
- To enable to manage stress effectively
- To enable them to develop employability skills

SYLLABUS

UNIT – I

INTRODUCTION

Definition – Scope – Importance- – Methods of improving soft skills – Limits- Analysis – Interpersonal and intrapersonal skills - Verbal and Non-verbal skills.

Learning Outcomes:

At the end of the module, the learners will be able to
- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Analyze various soft skills in different situations
- Distinguish various soft skills
- Apply various soft skills in day to day life and in workplace

UNIT – II INTRAPERSONAL SKILLS

Knowing self/temperaments/traits - Johari windows – quotient skills(IQ, EQ, SQ), creativity, decision-making-Attitude – Confidence Building - Positive Thinking –Time Management – Goal setting.

Learning Outcomes:

At the end of the module, the learners will be able to
- Understand self and its temperament.
- Apply various techniques to know the self.
- Develop positive thinking
- Develop creative thinking and decision-making skills
- Apply self-knowing tools in day to day and professional life.

UNIT – III

INTERPERSONAL SKILLS

Leadership Skills – Negotiation skills –- Team-building – Crisis Management – Event Management –Ethics and Etiquettes.

Learning Outcomes:

At the end of the module, the learners will be able to
- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills.
- Develop team building spirit.
- Develop crisis management
- Apply interpersonal skills through etiquettes.

UNIT – IV

VERBAL SKILLS

Importance of verbal skills in corporate climate, Listening skills –Mother Tongue Influence (MTI) - Speaking skills – Public speaking - Oral presentations - Writing skills –E-mail etiquettes – Memos - Indianism

Learning Outcomes:

At the end of the module, the learners will be able to
- Understand the importance of verbal skills in corporate climate.
- Explain the need of listening skills.
- Explore MTI and suggest remedies to avoid it.
- Interpret various contexts of speaking.
- Apply verbal skills in personal and professional life.

UNIT – V NON-VERBAL SKILLS

Importance of body language in corporate culture – body language-Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause& selection of words

Learning Outcomes:

At the end of the module, the learners will be able to
- Comprehend the importance of non-verbal communication.
- Expound the need of facial expressions, postures and gestures.
- Analyze proxemics,haptics etc.
- Understand the importance of dress code.
- Apply various techniques to use para language

Course Outcomes
- Recognize the importance of verbal and non verbal skills
- Develop the interpersonal and intrapersonal skills
- Apply the knowledge in setting the SMART goals and achieve the set goals
- Analyze difficult situations and solve the problems in stress-free environment
- Create trust among people and develop employability skills

Text Books

1. Meenakshi Raman &ShaliniUpadhyay " Soft Skills",Cengage Learning, 2018.
2. S. Balasubramaniam, "Soft Skills for Interpersonal Communication", Orient Black Swan, 2017.

References

1. Barun K. Mitra, "Personality Development and Soft Skills**, –**OXFORD Higher Education 2018.
2. AlkaWadkar, "Life Skills for Success ", Sage Publications 2016.
3. Robert M Sheffield, "Developing Soft Skills", Pearson, 2010.
4. DianaBooher, "Communicate With Confidence",Tata McGrawhill, 2012.

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HUMANITIES ELECTIVE-I

(19A52602a) ENTREPRENEURSHIP & INCUBATION

COURSE OBJECTIVES :

The objective of this course is

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

Syllabus

UNIT-I

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

Learning Outcomes:

At the end if the Unit, the learners will be able to
- Understand the concept of Entrepreneur and Entrepreneurship in India
- Know Entrepreneurship process and emergence of Entrepreneurship
- Analyze the differences between Entrepreneur and Intrapreneur
- Develop a creative mind set and personality
- Understand recent trends in Entrepreneurship across the globe

UNIT-II

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

Learning Outcomes:

At the end if the Unit, the learners will be able to
- Know the process of starting a new venture
- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plans in project preparation and prepare project reports

UNIT-III

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Know the various sources of finance to start a new venture
- Contrast & compare between Long term & Short term finance sources
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

UNIT-IV

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Understand the role of government in promoting women entrepreneurship
- Know various incentives, subsidies and grants available to women entrepreneurs
- Analyze the role of export-oriented units
- Know about the tax concessions available for Women entrepreneurs
- Prepare to face the issues and challenges.

UNIT-V

Fundamentals of Business Incubation - Principles and good practices of business incubation-Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

Learning Outcomes:

At the end of the Unit, the learners will be able to:
- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Contrast & Compare between business incubation and business incubators.
- Design their own business incubation/incubators as viable-business unit.

Course Outcomes:
At the end of the course, students will be able to
- Understand the concept of Entrepreneurship and challenges in the world of competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
- Evaluate the role of central government and state government in promoting Entrepreneurship.
- Create and design business plan structure through incubations.

TEXT BOOKS

1. D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
2. Nandan H, " Fundamentals of Entrepreneurship", PHI, 2013

REFERENCES

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B.Janakiramand M.Rizwana‖ "Entrepreneurship Development: Text & Cases", Excel Books, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

E-RESOURCES

1. Entrepreneurship-Through-the-Lens-of-enture Capital

2. http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship

3. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd

4. http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE) – III-II   **L   T   P   C**
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(19A52602b) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives :

The objective of this course is

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To know the various types of Market Structures & pricing methods and its strategies
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on Accounting and to explain the process of preparing Financial statements

Syllabus

UNIT I -

INTRODUCTION TO MANAGERIAL ECONOMICS DEMAND

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis **-** Concept of Demand **-** Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Know the nature and scope of Managerial Economics and its importance
- Understand the concept of demand and its determinants
- Analyze the Elasticity and degree of elasticity
- Evaluate Demand forecasting methods
- Design the process of demand estimation for different types of demand

UNIT -II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Least-cost combination - Short-run and Long-run Production Function - Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale – **Cost & Break Even Analysis** - Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Know the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

UNIT –III

INTRODUCTION TO FORMS OF BUSINESS ORGANIZATIONS AND MARKETS

Market structures - Forms of Business Organizations - Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises-Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly - Monopolistic Competition – Oligopoly - Price-Output Determination - Pricing Methods and Strategies.

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Know the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost, revenue and profit
- Interpret Pricing Methods and Strategies

UNIT -IV

CAPITAL AND CAPITAL BUDGETING Concept of Capital - Significance **-** Types of Capital **-** Components of Working Capital - Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Cash Budget - **Capital Budgeting** – Features of

Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Know the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods
- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

UNIT –V

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Accounting Concepts and Conventions - Introduction Double-Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).*Financial Analysis -* Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Learning Outcomes:

At the end of the Unit, the learners will be able to
- Know the concept, convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

Data Books Required:

Present Value Factors table

Course Outcomes:

At the end of the course, students will be able to
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply concepts of production , cost and revenues for effective business decisions
- Students can analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Prepare the accounting statements and evaluate the financial performance of business entity.

TEXT BOOKS:

1. Varshney & Maheswari: "Managerial Economics", Sultan Chand, 2013.
2. Aryasri: "Business Economics and Financial Analysis", 4th edition, MGH, 2019

REFERENCES:

1. Ahuja Hl "Managerial economics" 3rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: "Managerial Economics and Financial Analysis", New Age International,. 2013.
3. Joseph G. Nellis and David Parker: "Principles of Business Economics", 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: "Managerial Economics in a Global Economy", Cengage, 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (EEE)– III-II   **L   T   P   C**
                                                        3   0   0   3

(19A52602c) BUSINESS ETHICS AND CORPORATE GOVERNANCE

Course Objectives :

The objectives of this course are

- To make the student understand the principles of business ethics
- To enable them in knowing the ethics in management
- To facilitate the student role in corporate culture
- Impart knowledge about the fair trade practices
- Encourage the student in knowing them about the corporate governance

Syllabus

BUSINESS ETHICS AND CORPORATE GOVERNANCE
UNIT -I

Introduction – Meaning - Nature and Scope – Loyalty and Ethical Behaviour, Values across Cultures; Business Ethics – Ethical Practices inManagement. Types of Ethics – Characteristics – Factors influencing ,   Business Ethics – Importance of Business Ethics - Arguments for and against business ethicsBasics of business ethics Corporate Social Responsibility – Issues of Management – Crisis Management

Learning Outcomes:

After completion of this unit student will
- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Know about the factors influencing business ethics
- Understand the corporate social responsibility of management

UNIT –II
ETHICS IN MANAGEMENT

Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management- Technology Ethics and Professional ethics. The   Ethical   Value   System   –   Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:

After completion of this unit student will
- Understand the meaning of Marketing Ethics
- Analyze Differentiate between Technical ethics and professional ethics
- Know about the ethical value system
- Understand the Code and culture

UNIT-III

ROLE OF CORPORATE CULTURE IN BUSINESS
Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics,Emotional Honesty –
Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind. The
Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom
of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual
Ethics.

Learning Outcomes:

After completion of this unit student will
- Understand the corporate culture in business
- Analyze Ethical Value System Know about the ethical value system
- Know Universalism, Utilitarianism, Distributive Justice
- Differentiate Ethical Values in different Cultures

UNIT- IV
Law and Ethics – Relationship between Law and Ethics, Other Bodies in enforcing Ethical Business Behavior,
Social Responsibilities of Business – Environmental Protection, Fair Trade Practices, Fulfilling all Nation
Safeguarding Health and wellbeing of Customers.

Learning Outcomes:

After completion of this unit student will
- Understand Law and Ethics
- Analyze Social Responsibilities of Business
- Know Environmental Protection and Fair Trade Practices
- Implementing National Safeguarding Health and wellbeing of Customers

UNIT –V

CORPORATE GOVERNANCE

Meaning – scope - Issues, need, corporate governance code, transparency & disclosure, role of auditors, board of directors and shareholders; Global issues of governance, accounting and regulatory frame work, corporate scams, committees in India and abroad, corporate social responsibility composition of BODs - Cadbury Committee - various committees - reports on corporate governance - Benefits and Limitations of Corporate Governance with living examples.

Learning Outcomes:

After completion of this unit student will
- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders
- Know accounting and regulatory frame work
- Implementing corporate social responsibility

Course Outcomes:

At the end of the course, students will be able to
- Understand business ethics and ethical practices in management.
- Understand the role of ethics in management
- Apply the knowledge in cross cultural ethics
- Analyze law and ethics
- Evaluate corporate governance

TEXT BOOKS:

1. Murthy CSV: "Business Ethics and Corporate Governance", HPH
2. Bholananth Dutta, S.K. Podder – "Corporation Governance", VBH.

REFERENCE BOOKS:

1. Dr. K. Nirmala, KarunakaraReaddy : "Business Ethics and Corporate Governance", HPH
2. H.R.Machiraju: "Corporate Governance"
3. K. Venkataramana, "Corporate Governance", SHBP.
4. N.M.Khandelwal : "Indian Ethos and Values for Managers"

B.Tech (EEE)– III-II   **L   T   P   C**
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(19A52602d) ENTERPRISE RESOURCE PLANNING

Course Objectives :

The objectives of this course are
- To provide a contemporary and forward-looking on the theory and practice of
- Enterprise Resource Planning
- To enable the students in knowing the Advantages of ERP
- To train the students to develop the basic understanding of how ERP enriches the
- Business organizations in achieving a multidimensional growth.
- Impart knowledge about the historical background of BPR
- To aim at preparing the students,   technologically competitive and make them ready to self-upgrade with the higher technical skills.

Syllabus

UNIT-I

Introduction to ERP: Enterprise – An Overview Integrated Management Information, Business Modeling, Integrated Data Model Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing(OLAP), Supply Chain Management (SCM), Customer Relationship Management(CRM),

Learning Outcomes:

After completion of this unit student will
- Understand the concept of ERP
- Explain various Business modeling
- Know the contemporary technology like SCM, CRM
- Understand the OLAP

UNIT-II

Benefits of ERP: Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

Learning Outcomes:

After completion of this unit student will
- Understand the Advantages of ERP
- Explain the challenges associated with ERP System
- Analyze better customer satisfaction
- Differentiate Improved Information Accuracy and Design-making Capability

UNIT-III

ERP Implementation Lifecycle: Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-user Training, Post-implementation (Maintenance mode)

Learning Outcomes:

After completion of this unit student will
- Understand the implementation of ERP life cycle
- Explain the challenges associated with implementing ERP system
- Analyze the need of re-engineering
- Know the recent trends in team training testing and go-live

UNIT-IV

BPR: Historical background: Nature, significance and rationale of business process reengineering (BPR), Fundamentals of BPR. Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, Measuring existing processes,

Learning Outcomes:

After completion of this unit student will
- Understand the business process reengineering
- Explain the challenges associated with BPR
- Analyze the need of process redesign
- Differentiate between process to be redesign and measuring existing process

UNIT-V

IT in ERP: Role of information technology (IT) and identifying IT levers. Designing and building a prototype of the new process: BPR phases, Relationship between BPR phases. MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System.

Learning Outcomes:

After completion of this unit student will
- Understand the role of IT
- Explain the challenges in Designing and building a prototype of the new process
- Analyze the need of MIS
- Differentiate between DSS and EIS

Course outcomes:

At the end of the course, students will be able to
- Understand the basic use of ERP Package and its role in integrating business functions.
- Explain the challenges of ERP system in the organization
- Apply the knowledge in implementing ERP system for business
- Evaluate the role of IT in taking decisions with MIS
- Create reengineered business processes with process redesign

TEXT BOOKS:
1. Pankaj Sharma. "Enterprise Resource Planning". Aph Publishing Corporation, New Delhi, 2004.
2. Alexis Leon, "Enterprise Resource Planning", IV Edition, Mc.Graw Hill, 2019

REFERENCE BOOKS:

1. Marianne Bradford "Modern ERP", 3rd edition.
2. "ERP making it happen Thomas f. Wallace and Michael
3. Directing the ERP Implementation Michael w pelphrey

B.Tech (EEE)– III-II   **L   T   P   C**
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(19A52602e)   SUPPLY CHAIN MANAGEMENT

Course Objectives :

The objectives of this course are
- To provide Knowledge on logistics and supply chain management
- To enable them in designing the distribution network
- To train the students in knowing the supply chain Analysis
- Impart knowledge on Dimensions of logistic
- To know the recent trends in supply chain management

Syllabus

UNIT-1

Introduction to Supply Chain Management
Supply chain - objectives - importance - decision phases - process view -competitive and supply chain strategies - achieving strategic fit – supply chain drivers - obstacles – framework - facilities -inventory-transportation-information-sourcing-pricing.

Learing Outcomes:-

After completion of this unit student will
- Understand the meaning and objectives of supply chain management
- Explain supply chain drivers
- Know the steps involved in SCM frame work
- Understand transportation information and pricing

UNIT-2

Designing the distribution network
Role of distribution - factors influencing distribution - design options - e-business and its impact – distribution networks in practice –network design in the supply chain - role of network -factors affecting the network design decisions modeling for supply chain. Role of transportation - modes and their performance – transportation infrastructure and policies - design options and their trade-offs tailored transportation.

Learning Outcomes:-

After completion of this unit student will
- Understand the different distribution network
- Explain the factors influencing network design in the supply chain
- Know the Role of transportation
- Analyze design options and their trade-offs

UNIT-3

Supply Chain Analysis.

Sourcing - In-house or Outsource - 3rd and 4th PLs - supplier scoring and assessment, selection - design collaboration - Procurement process - Sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of supply chain Analysis
- Explain design collaboration
- Know procurement process -sourcing planning and analysis
- Understand seasonal demand, bulk and spot contracts

UNIT-4

Dimensions of Logistics
A macro and micro dimension - logistics interfaces with other areas - approach to analyzing logistics systems - logistics and systems analysis - techniques of logistics system analysis - factors affecting the cost and importance of logistics. Demand Management and Customer Service Outbound to customer logistics systems - Demand Management –Traditional Forecasting - CPFRP - customer service - expected cost of stock outs - channels of distribution.

Learning Outcomes:-

After completion of this unit student will
- Understand dimensions of logistics
- Explain logistics interfaces with other areas
- Know techniques of logistics system analysis
- Understand Demand Management

UNIT-5

Recent Trends in Supply Chain Management-Introduction, New Developments in Supply Chain Management, Outsourcing Supply Chain Operations, Co-Maker ship, The Role of E-Commerce in Supply Chain Management, Green Supply Chain Management, Distribution Resource Planning, World Class Supply Chain Management

Learning Outcomes:-

After completion of this unit student will
- Understand the recent trend in supply chain management
- Explain The Role of E-Commerce in Supply Management
- Know Green Supply Chain Management
- Understand Distribution Resource Planning

Course Outcomes:

At the end of the course, students will be able to
- Understand the strategic role of logistic and supply chain management in the cost reduction and offering best service to the customer
- Understand Advantages of SCM in business
- Apply the knowledge of supply chain Analysis
- Analyze reengineered business processes for successful SCM implementation
- Evaluate Recent trend in supply chain management

TEXT BOOKS:

1. Sunil Chopra and Peter Meindl, Supply Chain Management – "Strategy, Planning and Operation", 3rd Edition, Pearson/PHI, 2007.
2. Supply Chain Management by Janat Shah Pearson Publication 2008.

REFERENCE BOOKS:

1. A Logistic approach to Supply Chain Management – Coyle, Bardi, Longley, Cengage Learning, 1/e
2. Donald J Bowersox, Dand J Closs, M Bixby Coluper, "Supply Chain Logistics Management", 2nd edition, TMH, 2008.
3. Wisner, Keong Leong and Keah-Choon Tan, "Principles of Supply Chain Management A Balanced Approach", Cengage Learning, 1/e
4. David Simchi-Levi et al, "Designing and Managing the Supply Chain" – Concepts

B.Tech (EEE)– III-II Sem   **L   T   P   C**
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(19A02605) CONTROL SYSTEMS & SIMULATION LAB

Objectives: This course introduces

COURSE OBJECTIVES

- Determination of transfer functions of various systems and control of it by different methodologies.
- To provide knowledge in the analysis and design of controllers and compensators.
- The characteristics of servo mechanisms which are helpful in automatic control systems.
- To know the stability analysis using MATLAB.

Course Outcomes:

At the end of the course the student will be able to

- Get the knowledge of feedback control and transfer function of DC servo motor.
- Model the systems and able to design the controllers and compensators.
- Get the knowledge about the effect of poles and zeros location on transient and steady state behaviour of second order systems and can implement them to practical systems and MATLAB
- Determine the performance and time domain specifications of first and second order systems.

Any Eight of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order system
7. Lag and lead compensation – Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:-

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB – Verification.

REFERENCE BOOKS:

1. M.H.Rashid, "Simulation of Electrical and electronics Circuits", using PSPICE ,M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.

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B.Tech (EEE)– III-II Sem   **L   T   P   C**
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(19A02601P) DIGITAL COMPUTE PLATFORMS LAB

The student will understand about
- Assembly language programming on 8086 Microprocessors
- Interfacing of various devices with 8086
- MASAM Programming
- Interfacing 8051 Microcontroller with its peripheral devices.

Course Outcomes:

The student able to perform:
- Assembly language programming on 8086 Microprocessors.
- Interfacing of various devices with 8086.
- MASAM Programming.
- Interfacing 8051 Microcontroller with its peripheral devices

PART-A: List of Programs using MASAM/ALP:

1. Programs for 16 bit arithmetic operations for 8086 (using various addressing modes) .
2. Program for sorting an array for 8086
3. Program for searching for a number or character in a string for 8086
4. Program for String manipulations for 8086

PART-B: List of experiments using 8086 and 8051 modules:

1. Interfacing ADC and DAC to 8086.
2. Parallel communication between two microprocessors using 8255.
3. Serial communication between two microprocessor kits using 8251.
4. Interfacing to 8086 and programming to control stepper motor.
5. Programming using arithmetic, logical and bit manipulation instructions of 8051
6. Program and verify Timer/Counter in 8051.
7. Program and verify interrupt handling in 8051.
8. UART operation in 8051.
9. Communication between 8051 kit and PC.
10. Interfacing LCD to 8051.
11. Interfacing matrix or keyboard to 8051.

Note: List of programs in PART-A are mandatory and in PART-B at least Eight experiments must be performed

Reference Books:

1. Ray A. K., Bhurchandi K. M., "Advanced Microprocessor and Peripherals", 3rd Edition, Tata McGraw-Hill Publications, 2013.
2. Douglas V Hall, "Microprocessor and Interfacing ", 2nd Edition, Tata McGraw hill, 1992
3. Srinivasa Murthy, "Microprocessors and Microcontrollers Lab Manual": 8086 & 8051 Kindle Edition.

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B.Tech (EEE)– III-II Sem   **L   T   P   C**
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(19A99501) MANDATORY COURSE: CONSTITUTION OF INDIA

COURSE OBJECTIVES : The objective of this course is

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

Syllabus

UNIT-I

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution- Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

Learning Outcomes:-

After completion of this unit student will
- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union - Federalism - Centre-State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions

Learning Outcomes:-

After completion of this unit student will
- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO,Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning Outcomes:-

After completion of this unit student will
- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role ofZillaParishath block level organization

UNIT-V

Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

Learning Outcomes:-

After completion of this unit student will
- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

Course Outcomes:

At the end of the course, students will be able to
- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

- Understand the value of the fundamental rights and duties for becoming good citizen of India.

- Analyze the decentralization of power between central, state and local self-government
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

TEXT BOOKS

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi

2. Subash Kashyap, "Indian Constitution", National Book Trust

REFERENCES:

1. J.A. Siwach, "Dynamics of Indian Government & Politics".
2. H.M.Sreevai, "Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, "Indian Government and Politics", Hans India
4. M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution