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

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.	19A01501	Design of Reinforced Concrete Structures	PC	2-1-0	3
2.	19A01502	Water Resources Engineering	PC	3-0-0	3
3.	19A01503T	Engineering Geology	PC	2-0-0	2
4.	19A01504	Structural Analysis-II	PC	2-1-0	3
5.	19A01505a 19A01505b 19A01505c 19A01505d 19A01505e	Professional Elective-I Building Construction Practice Subsurface Investigation and Instrumentation Environmental Pollution and Control Advanced Surveying Urban Hydrology	PE	3-0-0	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	OE	3-0-0	3
7.	19A01507	Computer Aided Civil Engineering Drawing	PC	0-0-3	1.5
8.	19A01508	Environmental Engineering Lab	PC	0-0-3	1.5
9.	19A01503P	Engineering Geology Lab	PC	0-0-2	1.0
10.	19A01509	Socially Relevant Project	PR	------	0.5
11.	19A99501	Mandatory course: Constitution of India	MC	3-0-0	0
				Total	**21.5**

		Semester - 6 (Theory - 6, Lab - 2)			
S.No	Course No	Course Name	Cate gory	L-T-P	Credits
1.	19A01601T	Geotechnical Engineering -I	PC	2-1-0	3
2.	19A01602	Design of Steel Structures	PC	2-1-0	3
3.	19A52601T	English Language Skills	HS	3-0-0	3
4.		Professional Elective-II	PE	3-0-0	3
	19A01603a	Repair and Rehabilitation of Structures			
	19A01603b	Ground Improvement Techniques			
	19A01603c	Air Pollution Engineering			
	19A01603d	Railway Engineering			
	19A01603e	Hydropower Development			
5.		Open Elective-II	OE	3-0-0	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	HE	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.	19A01601P	Geotechnical Engineering lab	PC	0-0-3	1.5
8.	19A52601P	English Language Skills Lab	HS	0-0-3	1.5
9.	19A01605	Socially Relevant Project	PR	------	0.5
10.	19A99601	Mandatory Course: Research Methodology	MC	3-0-0	0
				Total	21.5

| **Semester – 7 (Theory - 5, Labs -2 & Project – 1)** |

S.No	Course No	Course Name	Category	L-T-P	Credits
1.	19A01701	Geotechnical Engineering-II	PC	2-1-0	3
2.	19A01702	Estimation & costing	PC	2-1-0	3
3.	19A01703a1 19A01703a2 19A01703b1 19A01703b2 19A01703c1 19A01703c2 19A01703d1 19A01703d2 19A01703e1 19A01703e2	Professional Elective-III Bridge Engineering Prestressed concrete Expansive soils Rock Mechanics Industrial Waste & Waste Water Engineering Remote Sensing and GIS Traffic Engineering Urban Transportation Planning Water Resources System Analysis OR River Basin Management	PE	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)	OE	3-0-0	3
5.	19A52701a 19A52701b 19A52701c 19A52701d 19A52701e	Humanities Elective-II Organizational Behavior Management Science Business Environment Strategic Management E-Business	HS	3-0-0	3
6.	19A01404P	Concrete technology Lab	PC	0-0-3	1.5
7.	19A01705	Computer Aided Design Lab	PC	0-0-3	1.5
8.	19A01706	Project*	PR	------	2
9.	19A01707	Industrial Training/Skill Development/Research Project*	PR	------	1.5
				Total	**21.5**

**Semester – 8 (Theory - 2, Project – 1)**
S.No	**Course No**	**Course Name**	**Catego ry**	**L-T-P**	**Credits**
1.	19A01801a1 19A01801a2 19A01801a3 19A01801b1 19A01801b2 19A01801c1 19A01801c2 19A01801d1 19A01801d2 19A01801e1 19A01801e2 19A01801e3	Professional Elective-IV Finite Element Methods Advanced R.C.C Structural Design Advanced steel structures Advanced Foundation Engineering Soil structure interaction Environmental Impact Assessment Environmental Economics Docks and Harbor Engineering Traffic Analysis Design and Drawing of Irrigation Structures Water Shed Management Sustainable Water Resources Development	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.	19A01803	Project	PR	------	7
				Total	**13**

Areas for Socially Relevant Project in 5th Semester

a) Water quality analysis in a village /town

b) Survey camp

c) Road safety Audit

d) Environmental impact Audit

Areas for Socially Relevant Project in 6th Semester

a) Structural condition assessment of school buildings

b) Water resources management -Audit

c)Survey of waste management systems-Swachh Bharat

d)Survey of modern building materials & properties

e) Survey on Implementation of Government welfare schemes

MINOR DEGREE IN CIVIL ENGINEERING

CORE SUBJECTS- 5 X 3   =15

Labs   - 2 X 1.5 =3

Projects   - 1 X 2   = 2

                                 20

Core courses

    1)   Strength of materials-I
    2)   Building materials and Construction
    3)   Surveying
    4)   Concrete technology
    5)   Estimation and costing
    6)   Surveying Lab
    7)   Concrete Technology lab
    8)   Project.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– III-I Sem   **L T P C**
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(19A01501)   DESIGN OF REINFORCED CONCRETE STRUCTURES

Course objectives:

- To teach concepts of working stress and limit state methods.
- To impart design procedure of RC elements in flexure, shear and torsion.
- To teach design procedure for short and long RC columns.
- To explain design procedure of RC footings
- To demonstrate design of RC slab

UNIT- I:

Introduction:

Concepts of Reinforced concrete Design – Introduction to Working Stress Method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456:2000. **Beams:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

Learning Outcomes:

At the end of this unit, the student will be able to
- Familiarize with working stress and limit stress method of design.
- Understand stress block parameters in methods of analysis
- Design of beams of varying cross sections adopting IS Code

UNIT -II:

Shear and torsion:
Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing;

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand behavior of beams under shear and torsion
- Visualize importance of bond and anchorage
- Design and Detail RC beams under due to shear and torsion adopting IS Code.

UNIT -III:

Columns:
Short and Long columns – under axial loads, uniaxial bending and biaxial bending – I S Code provisions.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand behavior of columns with different slenderness characteristics
- Contrast behavior of columns axial. And under uniaxial biaxial eccentricities
- Design and detail RC columns under different loads adopting IS Code.

UNIT -IV:

Footings:
Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.

Learning Outcomes:

At the end of this unit, the student will be able to
- Classify footings based on shape and utility
- Examine the field conditions and suggest appropriate footings
- Design reinforced concrete footings.

UNIT- V:

Slabs & Stair Case:
Design of one way slab, Two-way slabs and continuous slab using I.S. Coefficients Limit state design for serviceability for deflection, cracking and codal provision. Design of doglegged staircase.

Learning Outcomes:

At the end of this unit, the student will be able to
- Classify understand performance of slabs based on dimensions
- Design reinforced concrete slabs & Stair cases as per IS codal provisions.

Codes/Tables: IS 456-2000 and relevant sheets (Pertaining to columns) of SP 16 Code books to be permitted into the examinations Hall.

Course Outcome:

After completing the course, the student will be able to,
- Understand the basic concepts of working stress and limit state design methods
- Design various RC elements like beams, columns, footings and slabs.
- Apply design concepts to complex structural systems in advanced courses.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Limit State Design", Laxmi, Publications Pvt. Ltd., New Delhi
2. P. C. Varghese, Limit state "designed of reinforced concrete", Prentice Hall of India, New Delhi

REFERENCES:

1. N. Krishna Raju, "Structural Design and Drawing", Universities Press Pvt Ltd, Hyderabad. 4rd edition 2020.
2. N. C. Sinha and S. K Roy, "Fundamentals of reinforced concrete" , S. Chand publishers
3. N.Subramanian, "Design of Reinforced concrete structures", Oxford university press.

I S CODE OF PRACTICE
IS 456- 2000 Code of practice for Reinforced Concrete Structures.

NOTE: Assignment on preparation of drawing sheets showing detailing of various RC Elements
All the designs to be taught in Limit State Method

Following plates should be prepared by the students.
- Reinforcement particulars of T-beams and L-beams.
- Reinforcement detailing of continuous beams.
- Reinforcement particulars of columns and footings.
- Detailing of One way, Two way and continuous slabs

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B.Tech (CE)– III-I Sem   L   T   P   C
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(19A01502)   WATER RESOURCE ENGINEERING

Course Objectives:

- To Illustrate hydrologic cycle and its relevance to Civil engineering
- To teach students understand physical processes in hydrology & components of the
- hydrologic cycle
- To demonstrate concepts and theory of physical processes and interactions
- To impart on measurement and estimation of the components hydrologic cycle.
- To provide an overview and understanding of Unit Hydrograph theory, flood frequency and its analysis

UNIT -I

Introduction:
Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.
Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand basics of engineering hydrology and its applications.
- Demonstrate measurement techniques of precipitation.
- Learn curves related to frequency of rainfall..

UNIT-II

Abstractions from Precipitation:
Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapo-transpiration: factors affecting, measurement, control - Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

Learning Outcomes:

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

- Attain knowledge on factors influencing evaporation.

- Analyze factors influencing infiltration.

UNIT-III

Runoff and Hydrograph analysis:
Catchment characteristics**,** Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph – Floods: Causes and effects .

Learning Outcomes:

At the end of this unit, the student will be able to
- Determine runoff characteristics and factors influencing runoff.
- Examine components of hydro graph.
- Develop knowledge on floods and its effects.

UNIT-IV
Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand basics about ground water.
- Learn and implement Darcy's law and Dupuit's equation.

UNIT-V

IRRIGATION:
Introduction-necessity and impotence of irrigation-advantages and ill-effects of irrigation; types of irrigation; methods of application of water; quality for irrigation water; duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty; soil-water-plant relationship; limiting soil moisture conditions, depth and frequency of irrigation.

LIST OF DRAWINGS:

Draw the following irrigation structures.

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator.

Course Outcomes

At the end of the course the students are able to
   ● Understand of the theories and principles governing the hydrologic processes.
   ● Identify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.
   ● Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
   ● Determine aquifer parameters, yield of wells and model hydrologic processes.
   ● Understand duty and delta.
   ● Understand soil, water, plant relationships.
   ● Design the Hydraulic structures.

TEXT BOOKS:

1. Jayarami Reddy P., "Engineering Hydrology", Laxmi Publications Pvt. Ltd., (2013), New Delhi
2. B.C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, "Irrigation and Water Power Engineering", Lakshmi Publications (P) Ltd.
3. C.Satyanarayana Murthy, "Design of minor irrigation and canal structures", Wiley eastern Ltd

REFERENCES:

1. Subramanya K., "Engineering Hydrology", Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. Santosh Kumar Garg," Irrigation Engineering and Hydraulic Structure", Khanna Publishers.
3. Chow V.T., D.R Maidment and L.W. Mays, "Applied hydrology", Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
4. Mays L.W, "Water Resources Engineering", Wiley India Pvt. Ltd, (2013).

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B.Tech (CE)– III-I Sem   **L   T   P   C**

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(19A01503T)   ENGINEERING GEOLOGY

Course Objectives:

- To understand weathering process and mass movement
- To distinguish geological formations
- To identify geological structures and process of rock mass quality.
- To identify subsurface information and groundwater potential sites through geophysical
- investigations
- To apply geological principles of mitigation of natural hazards and select sites for dams and tunnels

UNIT -I

Introduction:

Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group; Feldspar Group; Kaolin; Asbestos; Carbonate Group ; Gypsum; Mica Group; Ore minerals - Iron ores; pyrite; Chlorite

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain the formation of earth and its internal structure
- Understand weathering and formation of natural minerals
- Explain composition of minerals and their utilization in construction industry.

UNIT- II

Petrology & Structural Geology:

Definition of rock - Rock forming processes - Geological classification of rocks - Dykes and sills, common structures and textures - Megascopic study, Chemical and Mineralogical Composition of rock (Granite, Gabbro, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Tuff, Felsite, Gneiss, Schist, Quartzite, Breccia, Marble, Porphyries, Charnockite and Slate).

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand classification of rocks
- Demonstrate chemical composition
- Identify mineral composition of rock

UNIT -III

Structural Geology:
Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance insitu and drift soils, common types of soils, their origin and occurrence in India

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain formation of folds strike and dip of geological structures
- Assess importance of soils and
- Locate origin of different types of rocks and soils and their origin India

UNIT –IV

Geomorphology, hydrogeology and seismology:
Ground water, Water table - ground water exploration. site selection for dams and tunnels – analysis of failures in dams and tunnels - Seismic zones of India - Earth quakes, their causes and effects. Seismic waves, Richter scale. Landslides - causes and effects; Tsunami –causes and effects.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand geomorphology
- Identify procedures for site selection of important structures
- Contrast seismic Zonation of India in stages
- Understand seismic scales and effects of major earthquakes earth quakes, landslides and Tsunami.

UNIT -V

Geophysical Studies:

Importance - Branches and necessity of Geophysical investigations - Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Electrical resistivity methods, and seismic refraction methods.

Learning Outcomes:

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

- Understand importance of Geophysical investigations
- Carryout geo physical investigations using various methods.

Course Outcomes:

At the end of the course student will be able to

- Gain basic knowledge on characteristics of rocks and minerals.
- Identify and differentiate rocks using geological classification.
- Carry out geo physical investigations for infrastructural projects.
- Apply concepts of structural geology for civil engineering structures.
- Understand the seismic zones of India.

TEXT BOOKS:

1. D.Venkata Reddy, "Engineering Geology, Second edition", Vikas Publishing house, Pvt, Ltd.
2. N. Chenna Kesavulu, "Text Book of Engineering Geology", 2nd Edition (2009), Macmillan Publishers India.
3. Vasudev Kanithi, "Engineering Geology", Universities Press Pvt Ltd, Hyderabad. 2012.

REFERENCES:

1. Parbin Singh, "Engineering and General Geology", 8th Edition (2010), S K Kataria & Sons.
2. J. C. Harvey, "Geology for Geotechnical Engineers", Cambridge University Press (1982).
3. Richard E. Goodman, "Engineering Geology, Rock in Engineering Construction", John Wiley & Sons, Inc. 1993.
4. Billings, M. P., "Structural Geology", Prentice-Hall India, 1974, New Delhi
5. S.K.Duggal, H.K Pandey, N.Rawal, "Engineering Geology", Mc.Graw Hill Education(India) Pvt. Ltd.

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B.Tech (CE)– III-I Sem
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(19A01504) STRUCTURAL ANALYSIS-II

Course objectives:
- To impart knowledge of rotation contribution method of analysis.
- To enable the student to analyze the two hinged and three hinged arches
- To impart the student the knowledge of rolling loads and influence lines.
- To enable the student to undergo the analysis of matrix methods.
- To inculcate the knowledge of plastic analysis to the student.

UNIT – I
Arches: Introduction- hinges-transfer of load to arches-linear arch-hinges in the arch-arch action-Horizontal force – three hinged arches – circular arches – springs at different level-Two hinged arches- two hinged circular arches – fixed arches (only theory) - Temperature stresses in arches.

Learning Outcomes:

At the end of this unit, the student will be able to
- To Differentiate between two hinged and three arches.
- To analyze the arches by finding axial thrust and radial shear.
- To know the temperature effect in arches.

UNIT – II

Rolling loads and influence line diagrams for determinate structures: Introduction-simply supported beams – single concentrated load- UDL longer than the beam span – UDL shorter than the beam span- two wheel axles separated by a distance- multiple wheel axles (train of loads)- influence line diagram for shear force and bending moments – influence line diagrams for three hinged arches.

Learning Outcomes:

At the end of this unit, the student will be able to
- Know the effect of rolling loads on bridges
- Draw the influence lines of variable for a given moving load on bridges.

UNIT – III

Matrix method of structural analysis-flexibility method: Introduction- Different approaches to matrix method- degree of static and kinematic indeterminacy-generalized coordinate system-flexibility matrix- application to beams.

Learning Outcomes:

At the end of this unit, the student will be able to
- Introduce matrix methods in structural analysis.
- Develop flexibility matrix for the structural elements.

UNIT – IV

Stiffness matrix method: Introduction- stiffness matrix-relationship between flexibility and stiffness matrices-flexibility matrix method- stiffness matrix method – application to simple beams.

Learning Outcomes:

At the end of this unit, the student will be able to
- Develop stiffness matrix for the structural elements.
- Develop relationship between flexibility and stiffness matrices.

UNIT – V

Plastic analysis: Introduction- definition of plastic hinge and plastic moment capacity – Assumptions- shape factor- shape factor for general sections – collapse load – basic theorems for finding collapse loads-methods of plastic analysis-static method-kinematic method- kinematic method applied to beams and simple frames- beam mechanism- sway mechanism-combined mechanism.

Learning Outcomes:

At the end of this unit, the student will be able to
- To know plastic moment capacity of a structural member.
- To find the collapse load for a structural member.
- To find the collapse mechanism for a structural member.

Course Outcomes:

At the end of the course student will be able to
- Analyze the final moments at the ends of the members
- Analyze bending moment, normal thrust and radial shear in the arches
- Analyze the variation of shear force and bending moment in the members due to rolling loads
- Analyze the degree of indeterminacy of the structures, reactions and displacements
- Analyze the formation of plastic hinges in different mechanisms

TEXT BOOKS:

1. Ramamurtham S., "Theory of Structures", Dhanpat Rai Publishing Company (p) Ltd,
2. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill
3. S.S. Bhavikatti, "Structural analysis", Volume 1 and 2, Vikas publishing house pvt. Ltd.
4. Dr.Vaidyanathan, Dr.P.Perumal, "Comprehensive structural analysis", Vol-II, Laxmi Publications (P) Ltd.

REFERENCES

1. Timoshenko & Young, "Theory of Structures", Tata McGraw Hill
2. Junarkar S. B., "Structural Mechanics", Vol I & II, Charotar Publishers
3. C. K. Wang, "Intermediate Structural Analysis", McGraw Hill

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B.Tech (CE)– III-I

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(19A01505a) BUILDING CONSTRUCTION PRACTICE
PROFESSIONAL ELECTIVES-I

Course Objectives:

- To Impart knowledge in investigation of soil condition, Deciding and design of suitable foundation for different structures
- To examine the good materials to be used for the construction work
- To teach to supervision of different types of masonry
- To illustrate the methodology in selection of materials, design and supervision of suitable type of floor and roof.
- To teach the methodology of constructing advances structures

UNIT -I:

Structural Components:

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand components of structures and their performance
- Explain construction materials their importance
- Understand formwork and scaffolding

UNIT -II:

Internal Construction and Finishes

Internal elements – Internal walls – Construction joints – Internal walls, fire protection – separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types

of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion - Paints – Whitewash and Colour wash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

Learning Outcomes:

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

- Understand internal components of structures and their performance
- Explain different features of interiors of a building and their importance
- Compare different types of construction materials
- Examine relative advantages and limitations

UNIT- III:

Construction of high rise buildings:
Construction methods and techniques using different materials, Minerals, Admixtures in-situ concrete, Precast Concrete & Structural Steel, finished concrete, tunnel form, fire Fighting, Safety & Hazards, Job Safety Analysis. Innovative methods of construction – Slip form technology, Jump form technology, Aluform & Tunnel Form Technology, Dry wall technology, Plastering Machines.

Learning Outcomes:

At the end of this unit, the student will be able to
- Develop knowledge on construction of high rise building
- Understand materials used for components of structures
- Explain safety requirements and provisions in high rise buildings

UNIT -IV:

Concepts and components of bridges:
Bridges, Steel Bridges, Arch Bridges, Cantilever Bridges Segmental construction & Box Girders. Construction of special type of bridges such as cable stayed bridge, suspension and Pre-stressed bridge, construction of foundation and Super structure. Construction of Metro Railway & Monorail - Underground and over ground structures, different methods and techniques of construction. Problems and solutions – during maintenance and upkeep of structures. Fire, Ventilation, Dewatering and power supply, Subsidence, Vibration etc., Concept of Mag-rail.

Learning Outcomes:

At the end of this unit, the student will be able to
- Classify types of bridges based on features materials and engineering

- Develop procedures for construction of different types of bridges
- Study advanced technologies in developing Metrorail facilities
- Appraise importance of maintenance of bridges

UNIT -V:

Construction of Power Generating Structures

Atomic Power stations, Thermal power stations- Generation Power Plants, Windmills, Transmission towers, Chimneys (single and multi-flue), cooling towers - Natural draft cooling towers (NDCT) & Induced draft cooling tower (IDCT), Ash handling system, Containment Structure, Electro Static Precipitator (ESP), Case study of Kaiga atomic power station, Madras atomic power station. Or Any other Case Study and Safety Hazards

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand procedures for construction of power generating infrastructure
- Develop knowledge on existing important power plants and their role in development

Course outcomes:

At the end of the course, the student will be able to
- Classify suitable materials for buildings and adopt suitable construction techniques.
- Adopt suitable internal finishes and maintenance work to enhance durability of buildings.
- Design of high rise buildings.
- Design of power generation structures.

TEXT BOOKS:

1. Roy Chudley and Roger Greeno, "Construction Technology", Prentice Hall, 2005.
2. Peurifoy, "Construction Planning, Equipment and methods", Tata McGraw Hill Publication

REFERENCES

1. Mahesh Varma, "Construction Equipment Planning and Applications".
2. Kumar Niraj Jha, - "Formwork for Concrete Structures", Mc Graw Hill Publication
3. Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015, Standard Publishers
4. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, "Building Construction", Laxmi Publications (P) Ltd., New Delhi.

B.Tech (CE)– III-I   **L T P C**
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(19A01505b)   SUBSURFACE INVESTIGATION AND INSTRUMENTATION PROFESSIONAL ELECTIVES-I

Course Objectives:

- To discuss the importance of site investigation,
- To narrate various exploration techniques
- To describe soil sampling techniques.
- To train with in-situ sub soil exploration methods
- To demonstrate instrumentation for sub soil exploration.

UNIT -I

Exploration and geophysical methods:

Exploration program planning -methods of exploration- preliminary and detailed design-spacing and depth of bores, data presentation. Geophysical exploration and interpretation, seismic and electrical methods, cross bore hole, single bore hole – up hole -down hole methods.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand exploration process
- Learn about different geophysical methods of exploration.

UNIT –II

Exploration Techniques

Methods of boring and drilling, non-displacement and displacement methods, drilling in difficult subsoil conditions, limitations of various drilling techniques, stabilization of boreholes, bore logs.

Learning Outcomes:

At the end of this unit, the student will be able to
- Learn various exploration techniques.
- Determine appropriate methods of exploration based on limitations

UNIT -III

Soil Sampling

Sampling Techniques – quality of samples – factors influencing sample quality - disturbed and undisturbed soil sampling advanced sampling techniques, offshore sampling, shallow penetration samplers, preservation and handling of samples.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand concepts of sampling
- Study different types of sampling techniques.

UNIT -IV

Field Testing In Soil Exploration

Field tests, penetration tests, Field vane shear, Insitu shear and bore hole shear test, pressure meter test, dilatometer test - plate load test–monotonic and cyclic; field permeability tests – block vibration test. Procedure, limitations, correction and data interpretation.

Learning Outcomes:

At the end of this unit, the student will be able to
- Develop in-situ soil exploration methods.
- Interpret data of soil exploration and documentation

UNIT -V

Instrumentation

Instrumentation in soil engineering, strain gauges, resistance and inductance type, load cells, earth pressure cells, settlement and heave gauges, pore pressure measurements - slope indicators, sensing units, case studies.

Learning Outcomes:

At the end of this unit, the student will be able to
- Choose appropriate instrumentation in sub soil exploration process.
- Soil Character measurement and case studies.

Course Outcomes:

At the end of the course student is able to
- Plan and execute sub soil investigation programme.
- Handle both laboratory and in-situ testing techniques.
- Carry out collection, handling and preservation of samples.
- Handle instruments during sub soil exploration process

TEXT BOOKS:

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation", CBS Publishers and Distributors, New Delhi, 2006.
2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.

REFERENCES:

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.
2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).
3. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985.
4. Hunt R. E., "Geotechnical Engineering Investigation Manual", McGraw Hill, 1984.

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B.Tech (CE)– III-I   **L T P C**
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(19A01505c)   ENVIRONMENTAL POLLUTION AND CONTROL
PROFESSIONAL ELECTIVE-I

Course Objectives:

- Impart knowledge on aspects of air pollution & control and noise pollution
- Impart concepts of treatment of waste water from industrial source.
- Differentiate the solid and hazardous waste based on characterization
- Introduce sanitation methods essential for protection of community health.
- Provide basic knowledge on sustainable development.

UNIT – I:

Air Pollution:

Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO:14000.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand control mechanism of air pollutants
- Design noise reduction techniques.

UNIT –II:

Industrial waste water Management:
Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand the importance of treatment process of industrial effluents.
- Design treatment plants

UNIT – III:

Solid Waste Management: solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration- Composting-Solid waste disposal methods – fundamentals of Land filling. **Hazardous Waste**: Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

Learning Outcomes:

At the end of this unit, the student will be able to
- Classification of solid waste and separation and procession solid waste
- Identification of Hazardous wastes
- Plan and execute solid waste and hazardous waste management.

UNIT – IV: Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand importance of hygienic environment
- Suggest appropriate rural sanitation methods to keep surrounding clean.

UNIT – V:

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

Learning Outcomes:

At the end of this unit, the student will be able to
- Execute sustainable development strategies.

Course Outcomes:

At the end of the course, the students will be able to:
- Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.

- Identify the air pollutant control devices and have knowledge on the NAAQ standards and air emission standards.
- Differentiate the treatment techniques used for sewage and industrial wastewater treatment.
- Inventing the methods of environmental sanitation and the management of community facilities without spread of epidemics.
- Appreciate the importance of sustainable development while planning a project or executing an activity.

TEXT BOOKS

1. Peavy, H. S., Rowe, D.R, Tchobanoglous, "Environmental Engineering", G.Mc-Graw Hill International Editions, New York 1985.
2. J. G. Henry and G.W. Heinke, "Environmental Science and Engineering", Pearson Education.

REFRENCES:

1. G. L. Karia and R.A. Christian, "Waste water treatment- concepts and design approach", Prentice Hall of India
2. M. N. Rao and H. V. N. Rao, "Air pollution", Tata Mc.Graw Hill Company.
3. Ruth F. "Weiner and Robin Matthews Environmental Engineering", 4th Edition Elesevier, 2003.
4. K. V. S. G. Murali Krishna, "Air Pollution and Control" by, Kousal & Co. Publications, New Delhi.

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B.Tech (CE)– III-I   **L   T   P   C**

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(19A01505d)   ADVANCED SURVEYING
PROFESSIONAL ELECTIVE-I

Course Objectives:

- To make the student to get well conversant with the fundamentals of triangulation surveying.
- To introduce to the students the methods of hydrographic surveying
- To make the student to use photogrammetry in surveying
- To enable the student to set simple horizontal curves.
- To introduce the knowledge construction surveys and usage of modern instrument such as total station.

UNIT – I

Triangulation: Geodetic surveying-classification of triangulation system-triangulation figures-strength of figure-reconnaissance- signals and towers.

Base line measurement- calculation of length of base line-Selecting a base line site- apparatus for baseline measurement-fieldwork for base measurement-corrections to the observed length of a base line-the base net-auxiliary operations in base line work.

Learning Outcomes:

At the end of this unit, the student will be able to
- To impart basic concepts of triangulation surveying.
- To impart the essentiality of the base line measurement in a triangulation system.

UNIT - II

Hydrographic surveying – Introduction-tides-equilibrium theory-spring tides and neap tides-priming and lagging-primary and derivative tide waves – lunar tidal interval- tide prediction-tide gauges-mean sea level-shoreline surveys-sounding equipment and methods-locating the soundings –reduction and plotting the soundings-three point problem-tidal current surveys-capacity of a reservoir –river surveying –area velocity method-weir method-chemical method .

Learning Outcomes:

At the end of this unit, the student will be able to
- To impart basic principles in hydrographic surveying.
- To know practical applications of soundings in hydrographic surveying.

UNIT - III

Photogrammetric Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand photogrammetry adopting various techniques.
- Map areas using triangulation
- Distinguish different types of plotting instruments

UNIT -IV Typical Curve Setting:

Compound and reverse curves- elements of compound curve-relationship between the parts of a compound curve-setting out compound curve-elements of a reverse curve-relatlionships between various parts of a reverse curve.

Transition curves-general requirements-length of transition curve- the ideal transition curve: clothoid-characteristics of a transition curve-computations and setting out – spiraling compound curves – spiraling of reverse curves – Bernoulli's lemniscates curve.

Vertical curves: Introduction to vertical curves – Types of vertical curves.

Learning Outcomes:

At the end of this unit, the student will be able to
- To understand about necessity of compound and reverse curves.
- To understand the essentiality condition for transition curves
- To understand the different vertical curves.

UNIT -V

Remote Sensing: Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

GPS: Segments, GPS measurements, errors and biases, co-ordinate transformation, accuracy considerations.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand principles of remote sensing.

- Carryout date acquisition and interpretation
- Understand the principles of GPS

Course Outcomes:

At the end of the course, the student will be able to:
- Apply triangulation in surveying
- Correlate knowledge to frontiers like Hydrography, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.
- Identify data collection methods and prepare field notes

TEXT BOOKS:

1. R. Subramanian, "Surveying and leveling", Oxford university press, New Delhi.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, "Global Positioning System" - Theory and Practice, Springer -Verlag Publishers, 2001.
4. C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018

REFERENCES:

1. Arthur R Benton and Philip J Taety, "Elements of Plane Surveying", McGraw Hill – 2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – "Surveying" (Vol – 1, 2 & 3), Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti; "Surveying", Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2)", Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. R. Agor Khanna "Surveying and leveling", Publishers 2015.

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B.Tech (CE)– III-I   **L   T   P   C**
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(19A01505e)   URBAN HYDROLOGY
PROFESSIONAL ELECTIVE-I

Course Objectives

- To impart impact of urbanization on catchment hydrology.
- To narrate the importance of rainfall runoff data for urban hydrology.
- To teach techniques for peak flow estimation for storm water drainage system design.
- To explain the design concepts of components in urban drainage systems.
- To Train for preparation of master urban drainage system.

UNIT -I:

Introduction:

Urbanization and its effect on water cycle – urban hydrologic cycle – Effect of urbanization on hydrology. **Precipitation Analysis**: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration and design of urban drainage systems, Intensity-Duration -Frequency (IDF) curves, design storms for urban drainage systems.

Learning Outcomes:

At the end of this unit, the student will be able to
- Define Urbanization and its effects
- Understand basic concepts of hydrological cycle.

UNIT -II:

Methods of Urban Drainage:
Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse , major and minor systems. Drainage systems**:** Open channel, underground drains, appurtenances, pumping, source control.

Learning Outcomes:

At the end of this unit, the student will be able to
- Acquire skills for rainfall data acquisition
- Design of drainage system.

UNIT -III:

Analysis and Management:
Storm water drainage structures, design of storm water network- Best Management Practices– detention and retention facilities, swales, constructed wetlands, models available for storm water management.

Learning Outcomes:

At the end of this unit, the student will be able to
- Design drainage network scheme.

UNIT -IV:

Master drainage plans:
Issues – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning , use of models in planning.

Learning Outcomes:

At the end of this unit, the student will be able to
- Prepare proper plan for storm water drainage system

UNIT –V:

Hydrological models:
General principles of hydrological modelling - The Rational Method - The time-area method - The unit hydrograph method - Physically based distributed models - Physically based partially distributed models - Hydraulic modelling - Model calibration and validation - Probabilistic models - Expert systems

Learning Outcomes:

At the end of this unit, the student will be able to
- Develop hydraulic models.

Course Outcomes

At the end of the course the student will be able to
- Develop intensity duration frequency curves for urban drainage systems.
- Develop design storms to size the various components of drainage systems.
- Apply best management practices to manage urban flooding.

- Develop master drainage plan for an urbanized area.

TEXT BOOKS:

1. Akan A.O and R.L. Houghtalen, "Urban Hydrology, Hydraulics and Stormwater Quality: Engineering Applications and Computer Modelling (2006)", Wiley International.
2. Hall M. J., Urban Hydrology (1984), Elsevier Applied Science Publisher.

REFERENCES BOOKS:

1. Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, "Manual on Drainage in Urbanised area' (1987 – 2 volumes)", Unesco,
2. Wanielista M. P. and Eaglin, Hydrology, "Quantity and Quality Analysis (1997)", Wiley and Sons.
3. Stahre P. and Urbonas B., "Stormwater Detention for Drainage (1990)", Water Quality and CSO Management, Prentice Hall.
4. Maksimovic C. and J. A. Tejada-Guibert, "Frontiers in Urban Water Management", Deadlock or Hope (2001), IWA Publishing.

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B.Tech (CE)–III-I   **L T P C**
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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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B.Tech (CE) –III-I   **L   T   P   C**
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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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B.Tech (CE)– III-I   **L   T   P   C**

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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.

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B.Tech (CE) – 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 (CE)– 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 FETs to solve complex Engineering problems (L2).
- Analyze the functions of FETs in CS configuration (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 (CE)– 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 (CE)– 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 (CE)– III-I   **L   T   P   C**
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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)

60 Page

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 (CE)– 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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– 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.

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B.Tech (CE) –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.

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B.Tech (CE) – 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

B.Tech (CE)– III-I Sem   **L   T   P   C**
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(19A01507)   COMPUTER AIDED CIVIL ENGINEERING DRAWING

Course Objectives:

- To make the student prepare engineering drawings conventionally involving various design parameters.
- To introduce fundamentals of computer aided drawing in Civil Engineering.
- To enable the student develop drawing of building components
- To train the student in Producing 2D & 3D drawings
- To enable the students Communicate designs graphically
- To teach methodologies for understanding and verification of CAD

UNIT -I

Introduction to drawing:
Introduction to Civil Engineering drawings, Interpretation of typical drawings, Scales – Elements of a building drawing – Plan, Section and Elevation from the given line drawing/Site plan/floor plan of residential and public buildings. Introduction to computer aided drawing, co-ordinate systems, and reference planes. Commands: Initial settings, Drawing commands, Modify commands

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand basic terms plan section and elevation in drawing
- Introduce computer applications in developing drawing skills

UNIT –II

Sign conventions and symbols:
Layers and Annotations in AUTOCAD, Conventional signs – Materials, Architecture, Structure, Electrical and Plumbing, Rebar drawings, Brick Bonds – Header, Stretcher, English and Flemish, one and half, two and two and half brick walls. Doors and Windows

Learning Outcomes:

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

- Acquaint with AUTOCAD software

- Identify sign conventions and symbols used in civil engineering drawing.

UNIT –III

Introduction to Building Planning
Development of 2D wireframe models in AUTOCAD
Introduction, terminology, Objectives of building bye-laws, Principles under laying building bye laws. Classification of buildings, Open space requirements. Floor area ratio, Floor space index, built up area limitations. Lighting and ventilation requirements.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand building bye-laws
- Understand planning the components of building and standard dimensions.

UNIT –IV

Basics of a building drawing:
Elements of planning building drawing, Methods of line and detailed drawing. Site plan, floor plan, elevation and section, drawing of residential buildings. Foundation details.

Learning Outcomes:

At the end of this unit, the student will be able to
- Draw various views of building.
- Develop floor plan, elevation and section

UNIT –V

Pictorial View: Principles of isometrics and perspective view of building.
Fundamentals of Building Information Modeling (BIM) using Revit Architecture. Introduction to Revit architecture software tools; Detailed planning of structural components, walls, floors, ceiling, roof, stairs; modify tools; structural modelling, column and beam system, foundations.

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand basic principles of BIM
- Draw the detailed structural elements and visualize.

List of Drawing Experiments:

1. Sign conventions and symbols
2. Masonry bonds
3. Doors and windows
4. Buildings with load bearing walls including details of doors and windows.
5. Taking standard drawings of a typical two storied building including all MEP.
6. Joinery, re-bars, finishing and other details and writing out a description of the RCC   framed structures
7. Reinforcement drawings for typical slabs,
8. Reinforcement drawings for typical beams,
9. Reinforcement drawings for typical columns
10. Reinforcement drawings for typical spread footings.
11. Industrial buildings - North light roof structures - Trusses
12. Perspective view of one and two storey buildings

Course Outcomes:

At The end of the course the student will be able to
● Develop drawing skills for effective demonstration of building details.
● Draw building plans using Computer Aided Design and Drafting software's.
● Develop engineering project drawings incorporating details and design parameters in 2D & 3D.
● Examine efficacy of CAD design.

TEXT BOOKS:
1. Subhash C Sharma & Gurucharan Singh (2005), "Civil Engineering Drawing", Standard Publishers
2. Ajeet Singh (2002), "Working with AUTOCAD 2000 with updates on AUTOCAD 200I", Tata- Mc Graw-Hill Company Limited, New Delhi
3. N. Kumara Swamy, A. Kameswara Rao "Building Planning and Drawing"

REFERENCES:

1. Balagopal and Prabhu (1987), "Building Drawing and Detailing", Spades publishing KDR building, Calicut, (Corresponding set of) CAD Software Theory and User Manuals.
2. Sikka, V.B. (2013), "A Course in Civil Engineering Drawing", S. K. Kataria & Sons,
3. Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education,

4. Venugopal (2007), "Engineering Drawing and Graphics + AUTOCAD", New Age International Pvt. Ltd.,

5. Nawari & Kuenstle,Building "Information Modeling (BIM): A framework for Structural Design", CRC press ISBN-13: 978-1482240436, ISBN-10: 1482240432, CRC Press, Taylor and Francis Group. http://www.crcpress.com/; spring 2015. By N. Nawari & M. Kuenstle.

6. Eastman BIM Handbook: "A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors".

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B.Tech (CE)– III-I Sem   **L T P C**
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(19A01508)   ENVIRONMENTAL ENGINEERING LAB

OBJECTIVE: The object of the course is to enable the students to identify the characteristics of water sample.

LABORATORY EXPERIMENTS
1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter & Wrinklers Method and B.O.D.
8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.

Course Outcomes:

At the end of the course, the student will be able to:
- Understand about quality of water and purification process
- Select appropriate technique for treatment of waste water.
- Assess the impact of air pollution
- Understand consequences of solid waste and its management.
- Design domestic plumbing systems.

TEXT BOOKS:

1. G. S. Birdi "Water supply and sanitary Engineering", Dhanpat Rai & Sons Publishers.
2. Peavy, H.S, Rowe, D. R. Tchobanoglous, "Environmental Engineering", Mc-Graw –Hill International Editions, New York 1985.

REFERENCES:

1. B.C. Punmia, Ashok Jain & Arun Jain, "Water Supply Engineering, Vol. 1, Waste water Engineering, Vol. II", Laxmi Publications Pvt. Ltd, New Delhi.
2. MetCalf and Eddy. "Wastewater Engineering, Treatment, Disposal and Reuse", Tata McGraw- Hill, New Delhi.
3. S. M. Patil, "Plumbing Engineering. Theory, Design and Practice",1999.
4. K. N. Duggal, "Elements of environmental engineering", S. Chand Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– III-I Sem   L   T   P   C
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(19A01503P)   ENGINEERING GEOLOGY LAB

OBJECTIVE: The object of the course is to enable the students to identify the physical characteristics various rocks .

LABORATORY EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of Rock forming minerals – Quartz group, Feldspar group,
2. Identification of Rock forming minerals Garnet group, Mica group
3. Physical properties of minerals: Mega-scopic identification of Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
4. Physical properties of minerals: Mega-scopic identification of Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
5. Megascopic description and identification of Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…
6. Megascopic description and identification of Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc…
7. Megascopic description and identification of Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc…
8. Interpretation and drawing of sections for geological maps showing tilted beds
9. Interpretation and drawing of sections for geological maps showing faults,
10. Interpretation and drawing of sections for geological maps showing unconformities etc.
11. Simple Structural Geology problems.
12. Strength of the rock using laboratory tests.

Course Outcomes: At the end of the course the students will be able to classify various types of rocks, their properties and they will be familiar with interpretation of geological maps.

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B.Tech (CE)– III-I Sem   **L   T   P   C**

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19A01509   SOCIALLY RELAVENT PROJECT

Areas for Socially Relevant Project in 5th Semester

a) Water quality analysis in a village /town

b) Survey camp

c) Road safety Audit

d) Environmental impact Audit

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B.Tech (CE)– III-I 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

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B.Tech (CE)– III-II Sem   **L   T   P   C**
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(19A01601T)   GEOTECHNICAL ENGINEERING -I

Course Objectives:

The objective of this course is:
- To enable the student to find out the index properties of the soil and classify it.
- To enable the student to determine permeability of soils using various methods.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
- To impart knowledge on soil exploration.
- To teach slope stability and safety assessment of earth retaining structures.
- To impart knowledge on bearing capacity and settlement of shallow foundations.
- To throw light on pile and well foundation designs.

UNIT I:

INTRODUCTION: Soil formation – soil structure – Adsorbed water – Mass- volume relationship – Relative density. Index Properties Of Soils: Moisture Content, Specific Gravity, In-situ density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils.

Learning Outcomes:-

After completion of this unit student will
- Understand the characteristics of soils
- Assess relationships between different parameters
- Determine soil properties
- Determine Liquid, Shrinkage and Plasticity Limits
- Characterize and classify soils based on different limits.

UNIT II:

PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flow nets : Characteristics and Uses.

Learning Outcomes:-

After completion of this unit student will
- Determine the permeability of soils and stratified soils.
- Explain factors effecting permeability
- Estimate the rate of seepage using flow net

UNIT III

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Wester guard's theories for point loads and areas of different shapes – Newmark's influence chart . Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

Learning Outcomes:-

After completion of this unit student will
- Compute stresses in soils under various loading conditions.
- Explain compaction of soils
- Compaction control can be understand.

UNIT IV:

CONSOLIDATION : Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre-consolidation pressure and its determination – Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods.

Learning Outcomes:-

After completion of this unit student will
- Understand the consolidations and settlement of soils.
- Differentiate compaction and consolidation
- Assessment of final settlements of soil
- Differentiate primary and secondary consolidation

UNIT V:

SHEAR STRENGTH OF SOILS : Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops.

Learning Outcomes:-

After completion of this unit student will
- Can able to determine the shear strength of the soil.
- To understand the various shear tests based on drainage conditions.
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Course Outcomes

On completion of the course, the students will be able to:
- Classify various types of soils using USCS and IS classification methods
- Understand the behavior of coarse grained and fine grained soils.
- Design earth dams using different methods.
- Calculate the stress distribution in foundations.
- Know the field Compaction control.
- Determination of settlement of foundations.
- Calculate the shear strength of soil under different drainage conditions.

TEXT BOOKS:

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation", CBS Publishers and Distributors, New Delhi, 2006.
2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.

3. Purushotham Raj -2013-"Soil Mechanics and foundation engineering" – 2nd edition, Pearson Publishers.

REFERENCES:

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.
2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).
3. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985.
4. Hunt R. E., "Geotechnical Engineering Investigation Manual", McGraw Hill, 1984.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B.Tech (CE) – III-II Sem

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(19A01602)   DESIGN OF STEEL STRUCTURES

Course Objectives
- To teach different types of Connections and relevant IS code provision.
- To impart with design procedures of beams and columns.
- To enable Design of truss elements
- To enable design of column bases
- To teach design and Plate and Gantry Girders with curtailment of flanges.

UNIT -I:

Connections:
Bolted connections – Bolt value, Welded connections: Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to in plane and out of plane.

Learning Outcomes:-

After completion of this unit student will
- Understand bolted and welded connections
- Estimate strength of welds
- Design Welded and Bolted connections as per IS Codal provisions

UNIT -II:

Tension Members and Compression members:
Design of members in direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses. Design of compression members. Roof Trusses: types of trusses – Design loads – Load combinations as per IS Code, detailing –Design of simple roof trusses elements (purlins, members and joints) – tubular trusses.

Learning Outcomes:-

After completion of this unit student will
- Understand behavior of tension members
- Understand behavior of compression members

- Design and detail of Tension and compression members under different conditions adopting IS Code.
- Design simple roof trusses and elements

UNIT -III:

Beams:
Allowable stresses, design of simple and compound beams-Curtailment of flange plates - IS Code-provision - Beam - to - beam connection, shear, buckling, check for deflection and bearing, laterally unsupported beams.

Learning Outcomes:-

After completion of this unit student will
- Understand behavior of simple and compound beams
- Visualize importance of curtailment of flange plates
- Design and detail of steel beams under different conditions adopting IS Code.

UNIT -IV:

Design of built-up columns and column bases:
Built-up columns with lacing and/or battening system. Design of Eccentrically loaded columns, Splicing of columns. **Design of Column bases:** slab base and gusseted base under axial load and moment.

Learning Outcomes:-

After completion of this unit student will
- Understand behavior of builtup columns
- Understand behavior of column bases
- Design and detail of built-up columns and column bases adopting IS Code.

UNIT -V:

Plate Girders:
Design of plate girder – IS code Provisions – Welded – Curtailment of flange plates,
Design of stiffeners – splicing and connections.

Learning Outcomes:-

After completion of this unit student will

- Identify different components of plate girder
- Design and detail of components of plate girder confirming to IS Code
- Understand the functioning of gantry girder for different types of loads

NOTE :Assignment on preparation of drawing sheets showing detailing of various Steel Elements

The students should prepare the following plates.
- Plate 1 Detailing of simple beams
- Plate 2 Detailing of Compound beams including curtailment of flanges
- Plate 3 Detailing of Column including lacing and battens.
- Plate 4 Detailing of Column bases – slab base and gusseted base
- Plate 5 Detailing of steel roof trusses including joint details.
- Plate 6 Detailing of Plate girder including curtailment, splicing
  Codes/Tables: IS-800 code books and Structural Steel Tables are to be permitted into the examination Hall.

I S Codes:
1) Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.
3) Steel Tables.

Course Outcomes:

At the end of this course the student will be able to
- Explain relevant IS codes
- Analysis and design of flexural members and detailing
- Design compression members of different types with connection detailing
- Design Plate Girder and Gantry Girder with connection detailing
- Develop drawings pertaining to different components of steel structures

TEXT BOOKS
1. N. Subramanian, "Design of Steel Structures Limit state method", (IS:800-2007) Oxford University Press.
2. S. K. Duggal, "Design of steel structures", Tata Mc Graw Hill, New Delhi.
3. N. Krishna Raju; "Structural Design and Drawing", 4th edition, (IS:800-2007) University Press

REFERENCES

1. Sarwar Alam Raz, "Structural Design in Steel", New Age International Publishers, New Delhi
2. M. Raghupathi, "Design of Steel Structures", Tata Mc. Graw-Hill.
3. L.S.Jayagopal and D.Tensing, "Design of steel structures", Vikas publishers

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– III-II Sem

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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 shouldbe 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

Prescribed Book

1. 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 (CE)– III-II   **L   T   P   C**
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(19A01603a)   REPAIR AND REHABILITATION OF STRUCTURES
PROFESSIONAL ELECTIVE-II

Course Objective

- To describe causes of distress in concrete structures and plan repair strategies.
- To explain issues on serviceability and durability of concrete.
- To throw light on various repair materials and their characteristics.
- To demonstrate repair techniques and protection measures.
- To illustrate suitable retrofitting schemes.

UNIT- I

Maintenance and repair strategies:
Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

Learning Outcomes:-

After completion of this unit student will
- Understand importance and requirement of maintenance
- Gain knowledge on quantification of repairs and documentation

UNIT -II

Serviceability and Durability of Concrete
Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness and cracking.

Learning Outcomes:-

After completion of this unit student will
- Understand serviceability and durability issues in concrete structures.
- Explain effect due to natural elements on structures

UNIT -III

Materials for Repair

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete.

Learning Outcomes:-

After completion of this unit student will
- List characteristics of materials used for repair.
- Understand suitability of certain materials for a specific type of repair

UNIT- IV

Techniques for Repair and Protection Methods

Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and drypack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidated structures – case studies

Learning Outcomes:-

After completion of this unit student will
- Explain techniques for repair and rehabilitation.
- Understand methods of corrosion protection and inhibition

UNIT -V

Retrofitting of Structures

Repairs to overcome low member strength. Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

Learning Outcomes:-

After completion of this unit student will
- Develop effective strategies for retrofitting.

Course outcomes:

At the end of the course the student will be able to,
- Understand evaluation procedure and plan for repair.
- Design suitable rehabilitation scheme for serviceability and durability.
- Choose suitable repair material for different magnitudes of distress.
- Apply efficient repair and retrofitting schemes.

TEXT BOOKS:

1. Dension Campbell, Allen and Harold Roper, " Concrete Structures", Materials,
2. "Maintenance and Repair", Longman Scientific and Technical, U.K.

REFERENCES:

1. R T. Allen and S.C. Edwards, "Repair of concrete Structures", Blakie and sons, UK.
2. Santhakumar, A. R. "Training Course notes on damage assessment and Repair in Structures"
3. Raikar, R. N. Learning from failures – "deficiencies in Design, construction and service" R&D centre (SDCPL), Raikar Bhavan, Bombay.
4. N. Palaniappan, "Estate Management, Anna Institute of Management", Madras.
5. F. K. Garas, J. L. Clarke, G.S.T. Armer, "Structural Assessment", Butterworths, UK.
6. A.R. Santhakumar, "Concrete chemicals – Theory and applications, Indian society for construction Engineering and Technology", Madras.

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B.Tech (CE) – III-II   **L   T   P   C**
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(19A01603b)   GROUND IMPROVEMENT TECHNIQUES
PROFESSINAL ELECTIVE-II

Course Objectives:

The objective of this course is:
- To understand need for different ground improvement methods adopted for improving the properties of re-moulded and in-situ soils by adopting different techniques
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
- To know geo-textiles and geo-synthetics can to improve the performance of soils.
- To learn the concepts, purpose and effects of grouting.

SYLLABUS:

UNIT- I
In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

Learning Outcomes:-

After completion of this unit student will
- Understand methods of in-situ densification
- Study different types of drains for soil densification

UNIT –II

Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

Learning Outcomes:-

After completion of this unit student will
- Understand methods of dewatering
- Study different types of dewatering and working criteria

UNIT- III

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

Learning Outcomes:-

After completion of this unit student will
- Study different methods of stabilization of soils
- Study utilization of industrial wastes to stabilize soils

UNIT- IV

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing

Learning Outcomes:-

After completion of this unit student will
- Understand principles of reinforced earth in ground improvement
- Study procedures for verification of stability of slopes.

UNIT- V

Geo-synthetics – Geo-textiles – types – functions, properties and applications – Geo-grids, Geo-membranes and gabions - properties and applications.
Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

Learning Outcomes:-

After completion of this unit student will
- Utilization of advanced materials for ground improvement
- Compare different types of synthetic based soil stabilization material and understand performance
- Understand methods of grouting
- Assess efficiency of grouting adopting different tests

Course Outcomes:

By the end of the course, the student should be able to
● Perceive the knowledge of various methods of ground improvement and their suitability to different field situations.
● Design a reinforced earth embankment and check its stability.
● Understand the functions of Geo-synthetics and their applications in Civil Engineering practice.
● Understand the concepts and applications of grouting.

TEXT BOOKS:

1. Manfred R. Haussmann, "Engineering Principles of Ground Modification:, McGraw Hill Pub. Co.,NewYork, 1990
2. Purushotham Raj, "Ground Improvement Techniques", Laxmi Publications, New Delhi.

REFERENCES:

1. G. L. Siva Kumar Babu, "An introduction to Soil Reinforcement and Geosynthetics", Universities Press.
2. M. P. Moseley, "Ground Improvement, Blackie Academic and Professional", USA.
3. Nihar Ranjan Patro, "Ground Improvement Techniques", Vikas Publishing House (p) Limited, New Delhi.
4. R. M. Koerner, "Designing with Geo-synthetics", Prentice Hall

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– III-II   **L   T   P   C**
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(19A01603c)   AIR POLLUTION ENGINEERING
PROFESSINAL ELECTIVE-II

Course Objectives:

- To teach the basics of air pollution
- To impart the behavior of air due to metrological influence
- To throw light on air quality management
- To teach the design of air pollution control methods

UNIT –I

Air Pollution:
Sampling and analysis of air pollutants, conversion of ppm into $\mu g/m^3$. Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution – Ozone holes and Climate Change and its impact - Carbon Trade.

Learning Outcomes:-

After completion of this unit student will
- Learn the basics of air pollutants.
- Estimate the impact of air pollution

UNIT-II

Thermodynamics and Kinetics of Air-pollution:
Applications in the removal of gases like SOx, NOx, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution. Odour pollution control, Flares.

Learning Outcomes:-

After completion of this unit student will
- Analyse and compute the parameters of air pollutants
- Evaluate procedures for control of pollution

UNIT –III

Meteorology and Air Pollution:
Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behavior and Air Quality - Wind rose diagrams and Isopleths- Plume Rise Models

Learning Outcomes:-

After completion of this unit student will
- Study properties of atmosphere
- Learn plume behavior in different environmental conditions

UNIT-IV

Ambient Air Quality Management:
Monitoring of SPM - RPM SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring – Noise Monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion.

Learning Outcomes:-

After completion of this unit student will
- Study he air quality management.
- Visualize emissions and their permissible standards

UNIT-V

Air Pollution Control Methods:
Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of Control Equipments –Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

Learning Outcomes:-

After completion of this unit student will

- Learn the design principles of particulate and gaseous control.
- Develop environmental friendly fuels and study their properties.

Course Outcomes:

At the end of this course, the students will be able to:
- Evaluating the ambient air quality based on the analysis of air pollutants
- Design particulate and gaseous control measures for an industry
- Judge the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities

TEXT BOOKS:

1. M. N. Rao and H. V. N. Rao, "Air Pollution", Tata McGraw Hill Company.
2. K. V. S. G. Murali Krishna, "Air Pollution and Control", Laxmi Publications, New Delhi, 2015.

REFERENCE:

1. R. K. Trivedy and P. K. Goel, "An Introduction to Air pollution", B.S. Publications.
2. Wark and Warner, Air Pollution, Harper & Row, New York.
3. Garg, S. K, "Environmental Engineering Vol. II (Sewage Disposal and Air Pollution Engineering)", Khanna Publishers.
4. Arya, S. P., "Air Pollution Meteorology and Dispersion", Oxford University Press.

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B.Tech (CE) – III-II   **L T P C**
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(19A01603d)   RAILWAY ENGINEERING
PROFESSIONAL ELECTIVE-II

Course Objectives:

The objective of this course is to:
- Comprehend different parts of railway track and their functions.
- Teach track construction and engineering applications
- Explain different essential features and requirements of different types of crossings
- Demonstrate signaling system and maintenance of tracks

SYLLABUS:

UNIT –I

Introduction to Indian Railways:
History and Importance of Indian Railways Construction and Maintenance- Permanent Way - Components-Rails, sleepers, ballast-functions and requirements- Gauges, Types, Uniformity of Gauge- Different Gauges in Indian Railways- Associated problems- Ideal Alignment- Standard Rail Sections- Causes and Effects of Creep- Measurement to Reduce Creep- Fixtures and Fastenings.

Learning Outcomes:-

After completion of this unit student will
- Understand the basics of railway components.
- Acquaint with gauges, alignment and standard rail sections.
- Understand different types of fixtures and fastenings

UNIT –II

Geometric Design of Railway Track:
Geometric design of railway track- Horizontal curves-radius and degree of curve-Cant-Cant Deficiency – Negative Cant – Permissible speed on railway tracks – Gradients- Grade Compensation On Curves.

Learning Outcomes:-

After completion of this unit student will
- Understand the geometric elements of railway track.
- Design the geometrics of railway track.

UNIT –III

Rail way signals
Classification of Railway Signals – Semaphore Signals- Working Philosophy Of Semaphore Signal – Other Types Of Signals – Their Functions .

Learning Outcomes:-

After completion of this unit student will
- Study the types and classification of signals.
- Understand the functions of various types of signals.

UNIT –IV

Railway Stations and Yards: Purposes- Facilities Required At Railway Stations- Classification Of Stations - Requirements Of Station Yard- Classification Of Yards – Terminals – Junctions – Layouts.

Learning Outcomes:-

After completion of this unit student will
- Study the different types of Stations and Yards.
- Understand the functions associated with stations and yards.

UNIT –V

Railway Control Systems:
Introduction – Different Types Of Control Systems – Absolute Block System – Automatic Block System – Operational Philosophy of these systems.

Learning Outcomes:-

After completion of this unit student will
- Study the types of control systems.

- Understand the operational philosophy of control systems.

Course Outcomes:

At the end of the course, the students will be able to:
- Explain components of Railway track, different Gauges.
- Design Track Gradients as per given requirements.
- Designing various types of Track Turnouts.
- Understand purposes and facilities at railway stations.
- Explain interlocking and modern signal systems.
- Identify surface defects on Railway Track and their remedial measures.

TEXT BOOKS:
1. S. C. Saxena and S. P. Arora, "A Text book of Railway Engineering", Dhanpatrai & Sons, Delhi.
2. C.Venkataramaiah., "Transportation Engineering (Vol – II)", Universities Press Pvt Ltd, Hyderabad.

REFERENCES:
1. Satish Chandra and M. M. Agarwal, "Railway Engineering", Oxford University Press, New   Delhi
2. R. Srinivasa Kumar, "Transportation Engineering", Railways, Airports, Docks and Harbors Universities Press Pvt Ltd, Hyderabad. 2014.
3. Vazirani & Chandola, "Transportation Engineering Vol I & II"
4. K. P. Subramanian, "Highway, Railway, Airport and Harbor Engineering", Sci.Tech publishers.

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B.Tech (CE)– III-II   **L T P C**
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(19A01603e) HYDROPOWER DEVELOPMENT
PROFESSIONAL ELECTIVE-II

Course Objectives:

- To teach concepts of Power potential in the world and India
- To impart with different types of Hydropower Plants and Classification
- To demonstrate different Water Conveyance systems
- To teach about different turbine draft tubes and water hammer effect
- To throw light on Planning and Design of Power house

UNIT -1

Introduction: Sources of power - Status of Power potential in the world and India. Transmission voltages and Hydropower - Estimation of water power potential. Source of Hydropower - Runoff and Stream flow. Stream flow analysis - Hydrograph, Mass curve and Flow duration curve.

Learning Outcomes:-

After completion of this unit student will
- Understand the basics of hydro power system.

UNIT -II

Hydropower Plants - Classification - Low and High head plants, Pumped storage plants Run - of - river plants - General arrangement of Run - of - river plants, Valley dam plants, High head diversion plants. Pumped storage plants - Advantages - Types of Pumped storage plants, Two and three unit arrangements.

Learning Outcomes:-

After completion of this unit student will
- Classify and components of hydro power plants.

UNIT -III

a. Water Conveyance systems.
Penstocks, Anchor blocks - Design criteria for Penstocks - Economical diameter of Penstock. Anchor blocks - Design principles of Anchor blocks. Valves, Bends and Manifolds

b. Intakes, canals and tunnels - Types of Intakes, Losses in Intakes, Air entrainment at Intakes - Inlet Aeration. Trash racks.

Learning Outcomes:-

After completion of this unit student will
- Acquire Knowledge on external components of hydro power plants.

UNIT- IV

Turbines - Main types - Hydraulic features - Turbine site, Constructional features - Lay out and arrangement. Draft tubes - Cavitation in Turbines - Governing of Turbines. Turbine Characteristics - Model testing - Water Hammer - Resonance in Penstocks. Surge tanks - Types and design principles of Simple Surge Tank.

Learning Outcomes:-

After completion of this unit student will
- Classify the turbine categories
- Design different types of turbines.

UNIT -V
Power house planning - Surface Power stations - Power house structure - Power house dimensions - Lighting and ventilations in Power house. Underground power stations - Location of Underground Power station - Components of Underground Power station. Features of some Typical Hydro - Power projects in India.

Learning Outcomes:-

After completion of this unit student will
- Study the concepts related to planning of hydro power plants.

Course Outcomes:

At the end of this course the student will be able to
- Understand the different sources of hydropower and estimation of potential.
- Hypothesizing the relevant procedures for planning hydro power plants.
- Design effective water conveyance systems and design.
- Design power house and features.

TEXT BOOKS:

1. S. K. Garg, "Irrigation engineering and Hydraulic structures", Standard Book House.
2. Punmia & Lal, "Irrigation and water power engineering" Laxmi publications Pvt. Ltd., New Delhi.

REFERENCES:

1. S K Sharma, "A Textbook Of Irrigation Engineering and Hydraulic Structures", S. Chand and Company Limited, New Delhi
2. P. N. Modi, "Irrigation and Water Resources & Water Power", Standard Book House.
3. G. L. Asawa, "Irrigation and water resources engineering", New Age International Publishers
4. Dilip Kumar Majumdar, "Irrigation water management", Principles and Practice, PHI Pvt. Ltd. NewDelhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE) – 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 (CE)– 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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– 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:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

TEXT BOOKS:

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

REFERENCES:

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

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B.Tech (CE)– III-II Sem

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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 (CE)– 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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– 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 ωo, 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 (CE)– 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).

135 Page

- 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", 3rd Edition, 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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B.Tech (CE)– III-II Sem   **L   T   P   C**
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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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– III-II Sem

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

B.Tech (CE)–III-II   **L   T   P   C**
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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 (CE)– 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 (CE)– III-II   **L   T P C**
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(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"

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B.Tech (CE)– 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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– 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

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(19A01601P)   GEOTECHNICAL ENGINEERING LAB

OBJECTIVE:

The object of the course is to enable the students to know the various characteristics soils

LABORATORY EXPERIMENTS

1. Specific gravity
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

Course Outcomes:

At the end of the course, the student must be able to:

● Identify various soils based on their characteristics.
● Evaluate permeability and seepage of soils.
● Determine plasticity characteristics of various soils.
● Design consolidation process by predicting settlement of soils.

TEXT BOOKS:

1. K. R. Arora, "Soil Mechanics and Foundation Engg"., Standard Publishers and Distributors, Delhi.
2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).

REFERENCES:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Soil Mechanics and Foundation", Laxmi publications Pvt. Ltd., New Delhi.
2. Gopal Ranjan & A. S. R. Rao, "Basic and Applied Soil Mechanics", New age International Pvt . Ltd, New Delhi.
3. Braja M. Das "Principles of Geotechnical Engineering", Cengage Learning.

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B.Tech (CE) – III-II Sem

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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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19A01605   SOCIALLY RELAVENT PROJECT

Areas for Socially Relevant Project in 6th Semester

a) Structural condition assessment of school buildings

b) Water resources management -Audit

c) Survey of waste management systems-Swatch Bharat

d) Survey of modern building materials & properties

e) Survey on Implementation of Government welfare schemes

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B.Tech (CE)– III-II 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