COURSE STRUCTURE & DETAILED SYLLABUS

ACE - R20

CIVIL ENGINEERING

B. TECH FOUR YEAR DEGREE COURSE

STRUCTURE & SYLLABUS

(2020 Batch)

IV Year II Semester

ACE

Engineering College

Ankushapur(V), Ghatkesar(M) - 501 301

(An Autonomous Institution, Affiliated to JNTUH ,Hyderabad)

ACE
Engineering College
Ankushapur(V), Ghatkesar(M), Medchal.Dist - 501 301
(Autonomous)

B.TECH. FOUR YEAR DEGREE COURSE
CIVIL ENGINEERING
COURSE STRUCTURE
IV Year II Semester

IV Year							II Semester
S.No.	Course Type	Course Code	Course Title	Periods Per Week			Credits
				L	T	P	
1	PEC		Professional Elective - V	3	0	0	3
2	PEC		Professional Elective - VI	3	0	0	3
3	OEC		Open Elective – III	3	0	0	3
4	PROJ	CE801PC	Project Phase – II	0	0	14	7
Total				**9**	**0**	**14**	**16**

Professional Elective – I

CE511PE	Concrete Technology
CE512PE	Theory of Elasticity
CE513PE	Rock Mechanics

Professional Elective – II

CE611PE	Prestressed Concrete
CE612PE	Elements of Earth Quake Engineering
CE613PE	Advanced Structural Analysis

Professional Elective-III

CE711PE	Remote Sensing &GIS
CE712PE	Ground Improvement Techniques
CE713PE	Advanced Structural Design

Professional Elective -IV

CE721PE	Irrigation and Hydraulic Structures
CE722PE	Pipeline Engineering
CE723PE	Ground Water Hydrology

Professional Elective –V

CE811PE	Solid Waste Management
CE812PE	Environmental Impact Assessment
CE813PE	Air pollution

Professional Elective -VI

CE821PE	Airports, Railways and Waterways
CE822PE	Urban Transportation Planning
CE823PE	Finite Element Methods for Civil Engineering

Open Elective – I

CE600OE	Disaster Preparedness & Planning Management (CE to Other Branches)
CS601OE	Fundamentals of Management For Engineers (Open Elective - I) (H&S to CE)
CS600OE	Entrepreneurship
CS602OE	Cyber Law & Ethic
EI600OE	Basics of Sensors Technology
EC600OE	Fundamentals of Internet of Things
EE600OE	Reliability Engineering
EE601OE	Renewable Energy Sources
ME600OE	Quantitative Analysis for Business Decisions

Open Elective – II

CE700OE	Remote Sensing & GIS (CE to Other Branches)
CS700OE	Data Structures (Open Elective - II) (CSE to CE)
CS701OE	Artificial Intelligence
CS702OE	Python Programming
CS703OE	Java Programming
EI700OE	Fundamentals of Biomedical Applications
EC700OE	Electronic Sensors
EE700OE	Utilization of Electrical Energy
EE701OE	Electric Drives and Control
ME700OE	Basic Mechanical Engineering

Open Elective – III

CE800OE	Environmental Impact Assessment (CE to Other Branches)
EE800OE	Basics of Power Plant Engineering
CS800OE	Machine Learning
CS801OE	Mobile Application Development
CS802OE	Scripting Languages
CS803OE	Database Management Systems
EI800OE	Basics of Virtual Instrumentation
EC800OE	Measuring Instruments
EE801OE	Energy Sources and Applications
ME800OE	Non-Conventional Sources of Energy (Open Elective - III) (ME to CE)

CE811PE: SOLID WASTE MANAGEMENT (PE – V)

B.Tech. IV Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CE811PE	PEC	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite:

Course Objectives: The objectives of the course are to:

- **Define** the terms **and Understands** the necessity of solid waste management
- **Explain** the strategies for the collection of solid waste
- **Describe** the solid waste disposal methods
- **Categorize** Hazardous Waste.

Course Outcomes: Upon completion of this course, students should be able to:

- Identify the physical and chemical composition of solid wastes
- Analyze the functional elements for solid waste management.
- Understand the techniques and methods used in transformation, conservation, and recovery ofmaterials from solid wastes.
- Identify and design waste disposal systems.

Unit: I	**Solid Waste**	No. of Classes: 9

Solid Waste: Definitions, Types of solid wastes, sources of solid wastes, Characteristics, and perspectives; properties of solid wastes, Sampling of Solid wastes, Elements of solid waste management - Integrated solid waste management, Solid Waste Management Rules 2016.

Unit: II	**Engineering Systems for Solid Waste Management**	No. of Classes: 9

Engineering Systems for Solid Waste Management: Solid waste generation; on-site handling, storage and processing; collection of solid wastes; Stationary container system and Hauled container systems – Route planning - transfer and transport; processing techniques;

Unit: III	**Engineering Systems for Resource and Energy Recovery**	No. of Classes: 9

Engineering Systems for Resource and Energy Recovery: Processing techniques; materials recovery systems; recovery of biological conversion products – Composting, pre and post processing, types of composting, Critical parameters, Problems with composing - recovery of thermal conversion products; Pyrolisis, Gasification, RDF - recovery of energy from conversion products; materials and energy recovery systems.

Unit: IV	**Landfills**	No. of Classes: 9

Landfills: Evolution of landfills – Types and Construction of landfills – Design considerations – Life of landfills- Landfill Problems – Lining of landfills – Types of liners – Leachate pollution and control – Monitoring landfills – Landfills reclamation.

Unit: V	**Hazardous waste Management**	No.of Classes: 9

Hazardous waste Management: – Sources and characteristics, Effects on environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedicalwaste disposal, E-waste management, Nuclear Wastes, Industrial waste Management.

Text Books:

1. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, EngineeringPrinciples and Management Issues' McGraw-Hill, 1993.
1. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole ThomsonLearning Inc., 2002.

Reference Books:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw HillInc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design andConstruction' Prentice Hall, 2002.

Web References:

E-Text Books:

CE812PE: ENVIRONMENTAL IMPACT ASSESSMENT (PE – V)

B.Tech. IV Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CE812PE	PEC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite:

Course Objectives: The objectives of the course are to:

- **Define and Classify** Environmental Impacts and the terminology
- **Understands** the environmental Impact assessment procedure
- **Explain** the EIA methodology
- **List and describe** environmental audits.

Course Outcomes: Upon completion of this course, students should be able to:

- Identify the environmental attributes to be considered for the EIA study
- Formulate objectives of the EIA studies
- Identify the methodology to prepare rapid EIA
- Prepare EIA reports and environmental management plans.

Unit: I	**Introduction**	No. of Classes: 9

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environmentand Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

Unit: II	**EIA Methodologies**	No. of Classes: 9

EIA Methodologies: Environmental attributes-Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation &Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts

Unit: III	**Environmental Management Plan**	No. of Classes: 9

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

Unit: IV	**Environmental Legislation and Life cycle Assessment**	No. of Classes: 9

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for controlof noise, loss of biodiversity, solid and Hazardous waste management rules.

Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria-case studies.

Unit: V	**Case Studies**	No.of Classes: 9

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

Text Books:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S.Publications, Hyderabad, 2007
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers,2002.

Reference Books:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand ReinholdCo., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., NewYork, 1996.

Web References:

E-Text Books:

CE813PE: AIR POLLUTION (PE – V)

B.Tech. IV Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CE813PE	PEC	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite:

Course Objectives: The objectives of the course are to:

- **Understand the** Air pollution Concepts
- **Identify** the source of air pollution
- **Know** Air pollution Control devices
- **Distinguish the** Air quality monitoring devices

Course Outcomes: Upon completion of this course, students should be able to:

- Identify sampling and analysis techniques for air quality assessment
- Describe the plume behavior for atmospheric stability conditions
- Apply plume dispersion modelling and assess the concentrations
- Design air pollution controlling devices.

Unit: I	**Air Pollution**	No. of Classes: 9

Air Pollution: Definition of Air Pollution - Sources & Classification of Air Pollutants - Effects of air pollution - Global effects – Ambient Air Quality and standards – Monitoring air pollution, Sampling and analysis of Pollutants in ambient air - Stack sampling.

Unit: II	**Meteorology and Air Pollution**	No. of Classes: 9

Meteorology and Air Pollution: Factors influencing air pollution, Wind rose, Mixing Depths, Lapse rates and dispersion - Atmospheric stability, Plume behavoiur, Plume rise and dispersion, Prediction of air quality, Box model - Gaussian model - Dispersion coefficient - Application of tall chimney for Pollutant dispersion.

Unit: III	**Control of Particulate Pollutants**	No. of Classes: 9
Control of Particulate Pollutants: Properties of particulate pollution - Particle size distribution - Control mechanism - Dust removal equipment – Working principles and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters & ESP.		
Unit: IV	**Control of Gaseous Pollutants**	No. of Classes: 9
Control of Gaseous Pollutants: Process and equipment for the removal by chemical methods - Working principles and operation of absorption and adsorption equipment - Combustion and condensation equipment.		
Unit: V	**Automobile and Indoor Pollution**	No.of Classes: 9
Automobile and Indoor Pollution: Vehicular pollution – Sources and types of emission – Effect of operating conditions-Alternate fuels and emissions-Emission controls and standards, Strategies to control automobile pollution– Causes of indoor air pollution-changes in indoor air quality-control and air cleaning systems-indoor air quality.		

Text Books:

1. M.N. Rao and HVN Rao, Air Pollution, Tata McGraw Hill Publishers
2. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999.

Reference Books:

1. Air Pollution Control Engineering by Nevers, , McGraw-Hill, Inc., 2000.
2. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H.
3. Air Pollution and Health by T. Holgate, Hillel S. Koren, Jonathan M. Samet, Robert L. Maynardpublisher Academic Press.

Web References:

E-Text Books:

CE821PE: AIRPORT, RAILWAYS, AND WATERWAYS (PE – VI)

B.Tech. IV Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CE821PE	PEC	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite:

Course Objectives: The objectives of the course are to:

- Deal with the characteristics of aircrafts related to airport design; runway and taxiway design,runway orientation, length, grading and drainage.
- Introduce component of railway tracks, train resistance, crossing, signaling, high speed tracksand Metro Rail.
- Explain the classes of harbors, features, planning and design of port facilities.

Course Outcomes: Upon completion of this course, students should be able to:

- An ability to design of runways and taxiways.
- An ability to design the infrastructure for large and small airports
- An ability to design various crossings and signals in Railway Projects.
- An ability plan the harbors and ports projects including the infrastructure required for newports and harbors.

Unit: I	**Airport Engineering**	No. of Classes: 9

Airport Engineering: Introduction to Air Transportation - Aircraft Characteristics - Factors Affecting Selection of site for Airport – Aprons – Taxiway – Hanger – Geometric design - Computation of Runway Length, Correction for Runway Length, Orientation of Runway, Wind Rose Diagram.

Unit: II	**Introduction to Railways**	No. of Classes: 9

Introduction to Railways: Role of Indian Railways in national development – Railways for Urban Transportation – LRT, Mono Rail, Metro Rail & MRTS. Permanent Way: Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers – Functions, Materials, Density – Functions, Materials, Ballast, Subgrade and Embankments, Ballast less Tracks.

Unit: III	**Geometric Design of Railway Track**	No. of Classes: 9

Geometric Design of Railway Track: Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal/Vertical Curves.

Unit: IV	**Track maintenance and Operation**	No. of Classes: 9

Track maintenance and Operation: Points and Crossings - Turnouts, Stations and Yards - Level Crossings. Signaling and Interlocking - Track Circuiting - Track Maintenance.

Unit: V	**Dock & Harbour Engineering**	No.of Classes: 9

Dock & Harbour Engineering: Water Transportation: Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification. Harbour works: breakwaters, jetties, fenders, piers, wharves, dolphins, etc., Navigational aids: types, requirements, light house, beacon lights, buoys, Port facilities: general layout, development, planning, facilities, terminals. Docks and repair facilities: design, dry docks, wet docks, slipways, Locks and lock gates: materials, size, Dredging: classification, dredgers, uses of dredged materials.

Text Books:

1. 1. Venkataramaiah C(2016), "Transportation Engineering Vol II – Railways, Airports, Docks,Harbors, Bridges and Tunnels", Universities Press (India) Private Limited, Hyderabad
2. J S Mundrey, Railway Track Engineering (5th Edition) McGraw Hill Education 2017.

Reference Books:

1. Subhash C. Saxena (2008) Airport Engineering, Planning and Design, CBS Publishers andDistributors, New Delhi. (Reprint 2015)
2. R. Srinivasan (2016), Harbour, Dock and Tunnel Engineering 28th Edition, Charotar PublishingHouse Pvt. Ltd.
3. Saxena SC and Arora S C (2010) A Text Book of Railway Engineering Paperback – 2010,Dhanpat Rai Publications (Reprint 2015)
4. Robert Horonjeff, Francis X. McKelvey, Willian J Sproule, Seth B. Young (2010), Planning &Design of Airports, McGraw-Hill Professional.
5. Transportaion Engineering by R. Srinivasa Kumar, University Press India.

Web References:

E-Text Books:

CE822PE: URBAN TRANSPORTATION PLANNING (PE – VI)

B.Tech. IV Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CE822PE	PEC	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: **Transportation Engineering**

Unit: I	**Transport Planning Process**	No. of Classes: 9

Transport Planning Process: Scope – interdependence of land use and traffic – systems approach totransport planning – Transport surveys – definition of study area – zoning survey - types and methods
inventory on transport facilities - inventory of land use and economic activities.

Unit: II	**Trip Generation**	No. of Classes: 9

Trip Generation: Factors governing trip generation and attraction rates – multiple linear regression analysis – category analysis – critical appraisal of techniques.

Unit: III	**Trip Distribution Methods**	No. of Classes: 9

Trip Distribution Methods: Presentation of trip distribution data - PA matrix to OD matrix – Growth factor methods - gravity model and its calibration – opportunity model.

Unit: IV	**Modal split analysis**	No. of Classes: 9

Modal split analysis: Influencing factors – Earlier modal split models: Trip end type and trip interchange type – limitations – Disaggregate mode choice model – Logit model - binary choice situations – multinomial logit model – model calibration.

Unit: V	**Route assignment**	No.of Classes: 9

Route assignment: Description of highway network – route choice behaviour – shortest path algorithm assignment techniques – all nothing assignment – multi path assignment – capacity restrained assignment – diversion curves.

Text Books:

1. Kadiyali, LR (1987), Traffic Engineering and Transportation Planning, Khanna Publishers, NewDelhi.
2. Hutchinson, B.G. (1974). Principles of Urban Transport Systems Planning. McGraw Hill BookCompany, New York.

Reference Books:

1. Papacostas, C. S., and Prevedouros, P.D. (2002). Transportation Engineering and Planning.3rd Edition, Prentice - Hall of India Pvt Ltd.
2. NPTEL videos on Urban Transportation Planning, Dr. V. Tamizh Arasan, IIT Madras
3. Paul.H. Wright (1995), Transportation Engineering – Planning & Design, John Wiley & Sons,New york.
4. John W Dickey (1995), Metropolitan Transportation Planning, Tata McGraw-Hill publishingcompany Ltd, New Delhi.

Web References:

E-Text Books:

CE823PE: FINITE ELEMENT METHODS FOR CIVIL ENGINEERING
(PE – VI)

B.Tech. IV Year II Semester								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CE823PE	PEC	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: 0	Practical Classes: 0				Total Classes: 45		

Prerequisite: SA – I & SA – II

Course Objectives: The objectives of the course are to:

The subject provides introduction to finite element methods to analyse structural elements.

Course Outcomes: Upon completion of this course, students should be able to:

At the end of the course the student will able to Anslyse simple structrual elements using Finite Element approach.

Unit: I	Introduction to Finite Element Method	No. of Classes: 9

Introduction to Finite Element Method – Basic Equations in Elasticity Stress – Strain equation – conceptof plane stress – plane strain advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom Displacement function – Natural Coordinates – strain displacement relations.

Unit: II	Lagrangian – Serendipity elements – Hermite polynomials – regular	No. of Classes: 9

Lagrangian – Serendipity elements – Hermite polynomials – regular, Irregular 2 D & 3D – Element – shape functions upto quadratic formulation.

Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffnessmatrix – stress – strain relation

Unit: III	FEA Beam elements	No. of Classes: 9

FEA Beam elements – stiffness matrix - shape function– Analysis of continuous beams.

Unit: IV	FEA Two-dimensional problem	No. of Classes: 9

FEA Two-dimensional problem – CST – LST element – shape function – stress – strain. Isoparametric formulation – Concepts of, isoparametric elements for 2D analysis - formulation of CST element.

Unit: V	Solution Techniques	No.of Classes: 9

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Text Books:

1. A first course in Finite Element Method by Daryl L. Logan, 5th Edition, Cengage Learning IndiaPvt. Ltd.
2. Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D.Belegundu, Prentice Hall of India

Reference Books:

1. Finite Element Aanalysis by P. Seshu, PHI Learning Private Limited
2. Concepts and applications of Finite Element Analysis by Robert D. Cook *et al.*, Wiley India Pvt.Ltd.
3. Applied Finite Element Analysis by G. Ramamurty, I.K. International Publishing House Pvt. Ltd.

Web References:

E-Text Books:

CE600OE: DISASTER PREPAREDNESS & PLANNING MANAGEMENT (Open Elective - I)

B.Tech. Civil Engg. III Year II Sem.

L	T/P/D	C
3	0/0/0	3

Course Objectives: The objectives of the course are

- To Understand basic concepts in Disaster Management.
- To Understand Definitions and Terminologies used in Disaster Management.
- To Understand Types and Categories of Disasters.
- To Understand the Challenges posed by Disasters.
- To understand Impacts of Disasters Key Skills.

Course Outcomes: The student will develop competencies in

- the application of Disaster Concepts to Management.
- Analyzing Relationship between Development and Disasters.
- Ability to understand Categories of Disasters.
- Realization of the responsibilities to society.

UNIT - I:

Introduction - Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.

UNIT - II

Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT - III

Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT - IV

Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT - V

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, landuse changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

TEXT BOOKS:

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
2. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, RajatPublication.
3. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation

REFERENCE BOOKS:

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State ofCalifornia, EMSA no.214, June 2003
4. Inter-Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health andPsychosocial Support in Emergency Settings. Geneva: IASC

CE700OE: REMOTE SENSING & GIS (Open Elective - II)

B.Tech. Civil Engg. IV Year I Sem.

L	T/P/D	C
3	0/0/0	3

Course Objectives: The objectives of the course are to

- Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digitalimages
- know the concept of Geographical Information System (GIS), coordinate system GIS Data andits types
- Understand the students managing the spatial Data Using GIS.
- Understand Implementation of GIS interface for practical usage.

Course Outcomes: After the completion of the course student should be able to:

- **Describe** different concepts and terms used in Remote Sensing and its data
- Understand the Data conversion and Process in different coordinate systems of GIS interface
- **Evaluate** the accuracy of Data and implementing a GIS
- **Understand the applicability** of RS and GIS for various applications

UNIT – I

Concepts of Remote Sensing Basics of remote sensing- elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology & units, energy resources, energy interactions with earth surface features & atmosphere, atmospheric effects, satellite orbits, Sensor Resolution, typesof sensors. Remote Sensing Platforms and Sensors, IRS satellites.

Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.

UNIT- II:

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, TheNature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co- ordinate systems, Map projections, Map transformation, Geo-referencing,

UNIT- III:

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization

Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata,

UNIT- IV:

Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macrocomponents of accuracy, sources of error in GIS.

Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, rasterdata analysis, Spatial data interpolation techniques

UNIT- V: Implementing a GIS and Applications

Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems,decision making using GIS

Applications of GIS

GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.

TEXT BOOKS

1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Edition, 2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGraw HillEducation (Indian Edition), 7th Edition, 2015.

3. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, WileyPublishers, 2012.

REFERENCE BOOKS

1. Remote Sensing and Image Interpretation by Thomas M. Lillesand and Ralph W. Kiefer,Wiley Publishers, 7th Edition, 2015.\
2. Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley IndiaPublication, 3rd Edition, 2010.
3. Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, R. SathiKumar, N. Madhu, Pearson Education, 1st Edition, 2007.
4. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy.

CE800OE: ENVIRONMENTAL IMPACT ASSESSMENT (Open Elective - III)

B.Tech. Civil Engg. IV Year II Sem.

L	T/P/D	C
3	0/0/0	3

Course Objectives: The objectives of the course are to

- **Define and Classify** Environmental Impacts and the terminology
- **Understands** the environmental Impact assessment procedure
- **Explain** the EIA methodology
- **List and describe** environmental audits

Course Outcomes: At the end of the course the student will be able to

- Identify the environmental attributes to be considered for the EIA study
- Formulate objectives of the EIA studies
- Identify the methodology to prepare rapid EIA
- Prepare EIA reports and environmental management plans

UNIT- I

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environmentand Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

UNIT- II

EIA Methodologies: Environmental attributes -Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts.

UNIT- III

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief &Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

UNIT- IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for controlof noise, loss of biodiversity, solid and Hazardous waste management rules.

Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria-case studies.

UNIT- V

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

TEXT BOOKS:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S.Publications, Hyderabad, 2007.
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2002

REFERENCE BOOKS:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand ReinholdCo., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., NewYork, 1996.

EE800OE: POWER PLANT ENGINEERING (OE-III)

Course Objectives:

I. **Analyze** different types of steam cycles and estimate efficiencies in a steam power plants
II. **Impart knowledge on** basic working principles of gas turbine and diesel engine power plants
III. **To Educate** about solar energy, fuel cells and other direct energy conversion methods.
IV. **To Illustrate** hydroelectric power generation and renewable energy sources
V. **To Analyze** the nuclear power stations and power plant economic calculations.

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

CO-1	**To Understand** various types of coal handling equipment, properties of coal and coal combustion techniques	BTL - 2
CO-2	**To analyze** various types of power plants and their components, performance and analysis of steam turbines and gas turbines.	BTL - 4
CO-3	**Evaluate** power generation potential of hydro power and wind power turbines	BTL – 5
CO-4	**To understand** solar energy, fuel cells and other direct energy conversion methods.	BTL – 2
CO-5	**To analyze** the impact of pollutants on environment and to estimate various costs related to power plants	BTL - 4

Syllabus:

UNIT-I

Coal Based Thermal Power Plants: Basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems.

UNIT – II

Internal Combustion Engine Plant:

Gas Turbine and Combined Cycle Power Plants: Brayton cycle analysis and optimization,
components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

UNIT-III

Basics of Nuclear Energy Conversion: Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

UNIT-IV

Hydroelectric Power Plants: Classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems.

Unit – V

Energy, Economic and Environmental Issues: Power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

TEXT BOOKS:

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.

REFERENCE BOOKS:

1. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

ME800OE: NON-CONVENTIONAL SOURCES OF ENERGY (Open Elective – III)

B.Tech. Mech. Engg. IV Year II Sem. **L T P C**

3 0 0 3

Pre-requisites: None

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

• Identify renewable energy sources and their utilization. Understand the basic concepts of solar radiation and analyze the working of solar and thermal systems.

• Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas and hydrogen.

• Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.

• Identify methods of energy storage for specific applications

UNIT – I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power - Physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT - II

Solar Energy Storage and Applications: Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications - solar heating/cooling techniques, solar distillation and drying, photovoltaic energy conversion.

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT - III

Bio-Mass: Principles of Bio-Conversion, Anaerobic /aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of biogas, utilization for cooking, I.C. Engine operation, and economic aspects.

UNIT - IV

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy – OTEC, Principles, utilization, setting of OTEC plants, thermodynamic cycles. Tidal and Wave energy: Potential and conversion techniques, mini-hydel power plants, their economics.

UNIT –V

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, Principles of DEC. Thermoelectric generators, Seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principle, faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Renewable Energy Resources / Tiwari and Ghosal / Narosa
2. Non- conventional Energy Sources / G.D. Rai/ Khanna Publishers
3. Biological Energy Resources/ Malcolm Fleischer & Chris Lawis/ E&FN Spon

REFERENCE BOOKS:

1. Renewable Energy Sources / Twidell & Weir
2. Solar Power Engineering / B.S. Magal Frank Kreith & J.F. Kreith
3. Principles of Solar Energy / Frank Krieth & John F Kreider
4. Non-Conventional Energy / Ashok V Desai / Wiley Eastern
5. Non-Conventional Energy Systems / K Mittal / Wheeler
6. Renewable Energy Technologies / Ramesh & Kumar / Narosa.