GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY(A)

Department of Civil Engineering

COURSE STRUCTURE

B. Tech. Civil Engineering

IV Year **I Semester**

S. No.	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
		T	P	D		Int.	Ext.	Total
1.	Water Resource Engineering -II	4	-	-	3	30	70	100
2.	Construction Technology and Management	4	-	-	3	30	70	100
3.	Prestressed Concrete	4	-	-	3	30	70	100
4.	Remote Sensing and GIS Applications	4	-	-	3	30	70	100
5.	**ELECTIVE-I**	4	-	-	3	30	70	100
6.	Design and Detailing Lab	-	3	-	2	50	50	100
7.	GIS & CAD Lab	-	3	-	2	50	50	100
8.	Summer Internship / Training	-	-	-	3	100	-	100
Total		**20**	**6**		**22**	**350**	**450**	**800**

Summer Internship / Training - To be done during summer vacation after III-II semester

T- THEORY P – PRACTICAL D- DRAWING C – CREDITS Int. – INTERNAL Ext. - EXTERNAL

IV Year **II Semester**

S. No.	Subject Title	Periods per week			C	Scheme of Examination Maximum Marks		
		T	P	D		Int.	Ext.	Total
1.	Estimating, Specifications & Contracts	4	-	-	3	30	70	100
2.	**ELECTIVE-II**	4	-	-	3	30	70	100
3.	**ELECTIVE-III**	4	-	-	3	30	70	100
4.	**ELECTIVE-IV**	4	-	-	3	30	70	100
5.	Project Work	-	-	-	9	60	140	200
6.	Intellectual Property Rights	4	-	-	-	-	-	-
Total		**24**			**21**	**180**	**420**	**600**

*IV Year B.Tech. (CE). – I Sem*ester

Water Resources Engineering–II

Course Objectives:

The course is designed to

a. ***Introduce the types of irrigation systems***
b. ***Introduce the concepts of planning and design of irrigation systems***
c. ***Discuss the relationships between soil, water and plant and their significance in planning an irrigation system.***
d. ***Understand design methods of erodible and non-erodible canals***
e. ***Know the principles of design of hydraulic structures on permeable foundations.***
f. ***Know the concepts for analysis and design principles of storage and diversion head works.***
g. ***Learn design principles of canal structures***

Unit – I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

Unit – II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals - Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

Unit – III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall.

Regulators: Head and cross regulators, design principles

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage.

Outlets: types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

Unit – IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

Unit – V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

Unit – VI
Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters, stability analysis-stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.
Spillways: Types, design principles of Ogee spillways, types of spillways crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

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

1. Estimate irrigation water requirements
2. Design irrigation canals and canal network
3. Plan an irrigation system
4. Design irrigation canal structures
5. Plan and design diversion head works
6. Analyse stability of gravity and earth dams
7. Design ogee spillways and energy dissipation works

Text Books:

1. 'Irrigation and Water Power Engineering' by B.C. Punmia, P.B.B Lal, Laxmi Publications Pvt. Ltd., New Delhi.
2. 'Irrigation Engg. & Hydraulic structures' by S.K. Garg, Khanna Publishers, New Delhi.

References:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T.K (2012), S.Chand & Co Publishers.
3. 'Water Resources Engineering' by Satyanarayana Murthy Challa (2008), New Age International Publishers.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Construction Technology and Management

Course Objectives:

The objective of this course is:

a. ***To introduce to the student the concept of project management including network drawing and monitoring.***
b. ***To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.***
c. ***To introduce the importance of safety in construction projects.***
d. ***To learn safety operation of construction machinery***
e. ***To learn techniques to distinguish civil structures safety***
f. ***To understand fire safety principles***

Unit – I

Construction project management: Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method.

Unit – II

Project evaluation: Project evaluation and review technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources.

Unit – III

Construction equipment: Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – capacities of trucks.– calculation of truck production – compaction equipment – types of compaction rollers.

Concreting equipment: Concreting equipment – Types of crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing.

Unit – IV

Hoisting and earthwork equipment: Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets. Safety in earth moving equipment.

Unit – V

Construction methods: Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering.

Unit – VI

Accidents Causes: Problems impeding safety in construction industry- causes of fatal accidents, related to various construction activities, human factors associated with these accidents.

Hazards Of Construction And Prevention: Excavations, basement and wide excavation, trenches, shafts – scaffolding , types, causes of accidents, scaffold inspection checklist

Safety in Demolition Work: Safety in demolition work, manual, mechanical, using explosive - keys to safe demolition, pre survey inspection, method statement, site supervision, safe clearance zone, health hazards from demolition

Course Outcomes

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

1. Appreciate the importance of construction planning.
2. Understand the functioning of various earth moving equipment.
3. Know the methods of production of aggregate products and concreting.
4. Apply the gained knowledge to project management and construction techniques.
5. Ensure safety while operating construction machinery
6. Outline safety plans for demolition of buildings
7. Prepare fire safety plans for a given building

Text Books :

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder , Shapira, Tata Mcgrawhill.
2. 'Construction Project Management Theory and Practice'by Kumar Neeraj Jha (2011), Pearson.
3. 'Reliability Maintenance and Safety Engineering, by Gupta A K, Laxmi Publications, New Delhi.

References:

1. 'Construction Project Management - An Integrated Approach' by Peter Fewings , Taylor and Francis
2. 'Construction Safety Hand Book'by V.J.Davies and K.Thomasin, Thomas Telford Ltd., London, 1990.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Prestressed Concrete

Course Objectives:

The objective of this course is:

a. ***Familiarize Students with concepts of prestressing.***
b. ***Equip student with different systems and devices used in prestressing.***
c. ***Understand the different losses of prestress including short and long term losses.***
d. ***Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion.***

Unit – I

Basic concepts of Prestressing: Basic concepts of Prestressing- Advantages and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Stress Corrosion- Durability, Fire Resistance, Cover Requirements.

Unit – II

Prestressing Systems: Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section- pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

Unit – III

Losses of Pre-stressing: Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage-bending of members and frictional losses- Total losses allowed for design.

Unit – IV

Design for Flexural Resistance: Design for Flexural resistance - Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing- Prediction of short term and long term deflections.

Unit – V

Design for Shear and Torsion: Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

Unit – VI

Transfer of Stresses: Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

Course Outcomes

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

1. Understand the different methods of prestressing.
2. Estimate the effective prestress including the short and long term losses.
3. Analyze and design prestressed concrete beams under flexure and shear.
4. Understand the relevant IS Codal provisions for prestressed concrete

Text Books :

1. 'Prestressed Concrete' by N. Krishna Raju, Tata McGraw hill
2. 'Prestressed Concrete' by S. Ramamrutham

References:

1. 'Prestressed Concrete' by P. Dayaratnam
2. 'Prestressed Concrete' by T. Y. Lin & Burns, Wiley Publications

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Remote Sensing and GIS Applications

Course Objectives:

The course is designed to

a. ***Introduce the basic principles of Remote Sensing and GIS techniques.***
b. ***Learn various types of sensors and platforms***
c. ***learn concepts of visual and digital image analyses***
d. ***Understand the principles of spatial analysis***
e. ***Appreciate application of RS and GIS to Civil engineering***

Unit – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT. Advanced sensors and its applications.

Unit – II

Image analysis: Introduction, elements of visual interpretations, digital image processing-image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

Unit – III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

Unit – IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

Unit – V

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

Unit – VI

Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

Course Outcomes

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

1. Be familiar with ground, air and satellite based sensor platforms.
2. Interpret the aerial photographs and satellite imageries
3. Create and input spatial data for GIS application
4. Apply RS and GIS concepts in water resources engineering

Text Books :

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
3. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
4. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt. Ltd, 2013.

References:

1. 'Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. 'Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. 'Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Ground Improvement Techniques

(Elective-I)

Course Objectives:

The objective of this course is:

a. ***To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.***
b. ***To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.***
c. ***To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.***
d. ***To make the student learn the concepts, purpose and effects of grouting.***

Unit – I

Densification Methods: 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.

Unit – II

Dewatering: 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

Unit – III

Stabilization of soils: 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.

Unit – IV

Reinforced earth: Reinforced earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

Unit – V

Geosynthetics: Geosynthetics – geotextiles – types – functions , properties and applications – geogrids , geomembranes and gabions - properties and applications.

Unit – VI

Grouting: Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

Course Outcomes

By the end of the course, the student should be able to

1. possess the knowledge of various methods of ground improvement and their suitability to different field situations.

2. The student should be in a position to design a reinforced earth embankment and check its stability.
3. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
4. The student should be able to understand the concepts and applications of grouting.

Text Books :

1. 'Ground Improvement Techniques'by Purushotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by Nihar Ranjan Patro, Vikas Publishing House (P) Limited, New Delhi.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.

References:

1. 'Ground Improvement' by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics' by RM Koerner, Prentice Hall.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Bridge Engineering

(Elective-I)

Course Objectives:

The objective of this course is:

a. ***Familiarize Students with different types of Bridges and IRC standards.***
b. ***Equip student with concepts and design of Slab Bridges, T Beam Bridges, Box Culverts.***
c. ***Understand concepts of design of Plate Girder Bridges***
d. ***Familiarize with different methods of inspection of bridges and maintenance.***

Unit – I

Introduction: Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading.

Unit – II

Slab bridges: Slab bridges -Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Guyon's – Massonet Method –Hendry- Jaegar Methods- Courbon's theory- Pigeaud's method.

Unit – III

T-Beam bridges: T-Beam bridges- Analysis and design of various elements of bridge – Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing.

Unit – IV

Plate Girder Bridges: Elements of plate girder and their design-web- flangeintermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.

Unit – V

Box Culverts: Loading –Analysis and Design- Reinforcement detailing.

Unit – VI

Inspection and Maintenance of Bridges: Procedures and methods for inspection – Testing of bridges- Maintenance of Sub Structures and Superstructures- Maintenance of bearings- Maintenance Schedules.

Course Outcomes

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

1. Explain different types of Bridges with diagrams and Loading standards
2. Carryout analysis and design of Slab bridges, T Beam bridges, Box culvers and suggest structural detailing
3. Carryout analysis and design of Plate girder bridges
4. Organize for attending inspections and maintenance of bridges and prepare reports.

Text Books :

1. ‘Essentials of Bridge Engineering’ by Jhonson Victor D
2. ‘Design of Bridge Structures’ by T. R. Jagadeesh, M.A. Jayaram, PHI
3. ‘Design of RC Structures’ by B. C. Punmai, Jain & Jain, Lakshmi Publications.

References:

1. ‘Design of Concrete Bridges’ by Aswini, Vazirani, Ratwani.
2. ‘Design of Steel Structures’ by B. C. Punmai, Jain & Jain, Lakshmi Publications.
3. ‘Design of Bridges’ by Krishna Raju.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Urban Hydrology

(Elective-I)

Course Objectives:

The course is designed to:

a. ***appreciate the impact of urbanization on catchment hydrology***
b. ***understand the importance of short duration rainfall runoff data for urban hydrology studies.***
c. ***learn the techniques for peak flow estimation for storm water drainage system design.***
d. ***understand the concepts in design of various components of urban drainage systems.***
e. ***learn some of the best management practices in urban drainage.***
f. ***understand the concepts of preparation master urban drainage system.***

Unit – I

Introduction: Urbanisation and its effect on water cycle – urban hydrologic cycle – trends in urbanisation – Effect of urbanisation on hydrology.

Unit – II

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration - Frequency (IDF) curves, design storms for urban drainage systems.

Unit – III

Approaches to 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.

Unit – IV

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

Unit – V

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.

Unit – VI

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

Course Outcomes

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

1. Develop intensity duration frequency curves for urban drainage systems.
2. Develop design storms to size the various components of drainage systems.
3. Apply best management practices to manage urban flooding.
4. Prepare master drainage plan for an urbanized area.

Text Books:

1. 'Manual on Drainage in Urbanised area'by Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, (1987 - 2 volumes), UNESCO,
2. 'Urban Hydrology' by Hall M J (1984), Elsevier Applied Science Publisher.
3. 'Hydrology – Quantity and Quality Analysis' by Wanielista M P and Eaglin (1997), Wiley and Sons.

References:

1. 'Storm water Detention for Drainage' by Stahre P and Urbonas B (1990), Water Quality and CSO Management, Prentice Hall.
2. 'Urban water cycle processes and interactions' by Marsalek et al (2006), Publication No. 78, UNESCO, Paris (http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)
3. 'Frontiers in Urban Water Management – Deadlock or Hope' by Maksimovic C and J A Tejada-Guibert (2001), IWA Publishing.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Advanced Surveying

(Elective-I)

Course Objectives:

The objective of this course is to enable the students to,

a. ***Understand the basics of Geodetic Surveying and triangulation systems.***
b. ***Understand the hygrographic surveying and prediction of tides.***
c. ***Understand the Photogrammetric Surveying and Astronomical Surveying.***
d. ***Understand the importance and applications of total stations and GPS.***

Unit – I

Geodetic Surveying: Definition, importance, triangulation system, order of triangulation, size and shape of triangulation, strength of figure criterion, triangulation fieldwork, base line measurement- tape corrections, problems in baseline measurement, measurement of angles.

Unit – II

Hydrographic Surveying: Tides-lunar tides, solar tides, spring and neap tides, measurement of tides- shore lines, soundings, sounding equipments, locating soundings by cross rope method and range and time intervals-mean sea level-prediction of tides**.**

Unit – III

Photogrammetric Surveying: Basic principles,-photo theodolite, horizontal and vertical angles from terrestrial photographs, elevation of a point by photographic measurement, determination of focal length of the lens, Aerial camera- scale of vertical photograph, scale of tilted photograph, combined effects of tilt and relief, stereoscopic vision, mosaics.

Unit – IV

Astronomical Surveying: Spherical Trigonometry, latitude and longitude, solar system, astronomical teams, coordinate systems-altitude, azimuth system, declination, hour angle system, time and astronomical work-sidereal time, apparent solar time, mean solar time, standard time, standard time, application of astronomy in surveying, corrections to astronomical observations.

Unit – V

Total stations: Importance, measurement of horizontal angles, vertical angles, horizontal distance, slope distance, height of object-remote elevation measurement (REM), remote distance measurement (RDM)-radial and continuous distances for measuring the lengths and sides of the closed circuits, areas and perimeters calculations.

Unit – VI

Global Positioning System: Principles of GPS, components of GPS, types of GPS and accuracy, applications of GPS, sources of error GPS and limitations.

Course Outcomes

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

1. The student should be able to conduct different types of surveys for obtaining better results.
2. The student should be able to utilize the total stations for getting the required information.
3. The student should be capable of using the GPS instrument to obtain appropriate information of the objectsand their positions.

Text Books:

1. 'Surveying and Levelling' by R. Subramanian, Oxford University Press, New Delhi.
2. A text book of Surveying' by C. Venkatramaiah, University Press, New Delhi.
3. 'Surveying Vol. II and Vol. III (Higher Surveying)' by Dr. B. C. Punmia, Ashok K. Jain and Arun K. Jain, Laxmi Publications Pvt. Ltd., New Delhi.
4. 'Advanced Surveying' by Satheesh Gopi, R. Sathikumar and N. Madhu, Pearson, New Delhi.

References:

1. 'Remote Sensing and its Applications' by L A R Narayan, Universities Press, New Delhi.
2. 'Geographical Information Science' by Narayan Panigrahi, Universities Press, New Delhi.
3. 'Basics of Remote Sensing and GIS' by Dr. S. Kumar, University Science Press, New Delhi.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

Design and Detailing Lab

Course Objectives:
The objective of this course is to enable the students to:

- ***a. Understand the quantity calculations of different components of the buildings.***
- ***b. Understand the rate analysis of different quantities of the buildings components.***
- ***c. Learn various specifications and components of the buildings.***

Design and detailing of –

1. Residential Building
2. Commercial Complex
3. Hospital Building
4. School Building
5. Water Tank
6. Retaining Wall

Course Outcomes
Upon the successful completion of this course:

1. The student should be able to determine the quantities of different components of buildings.
2. The student should be in a position to find the cost of various building components.
3. The student should be capable of finalizing the value of structures.

Text Books:

1. 'Structural Design and Drawing' by Krishna Raju, Orient Blackswan Pvt Ltd.-New Delhi
2. 'Limit State Design of Reinforced Concrete' by Dr. B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications (P) Ltd.
3. 'Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.

References:
GIET Lab Manuals

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – I Sem*ester

GIS & CAD Lab

Course Objectives:

The course is designed to

a. ***Introduce image processing and GIS software***
b. ***Familiarize structural analysis software***
c. ***Understand the process of digitization, creation of thematic map from toposheets and maps.***
d. ***Learn to apply GIS software to simple problems in water resources and transportation engineering.***
e. ***Learn to analyse 2 D and 3D frame steel tubular truss using structural analysis software.***
f. ***Learn to analyse and design retaining wall and simple towers.***

GIS:

SOFTWARES:

1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5

Any one or Equivalent.

EXCERCISES IN GIS:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering.

COMPUTER AIDED DESIGN AND DRAWING:

SOFTWARE:

1. STAAD PRO / Equivalent/
2. STRAAP
3. STUDDS

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple Tower Analysis and Design

Course Outcomes

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

1. Work comfortably on GIS software
2. Digitize and create thematic map and extract important features
3. Develop digital elevation model
4. Use structural analysis software to analyse and design 2D and 3D frames.
5. Design and analyse retaining wall and simple towers using CADD software.

Text Books :

1. 'Concept and Techniques of GIS' by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

References:

GIET Lab Manuals.

Web-Resources: www.nptel.com

IV Year B.Tech. (CE). – I Semester

SUMMER INTERNSHIP/TRAINING

*IV Year B.Tech. (CE). – II Sem*ester

Estimating, Specifications & Contracts

Course Objectives:

The objective of this course is to enable the students to:

a. ***Understand the quantity calculations of different components of the buildings.***
b. ***Understand the rate analysis of different quantities of the buildings components.***
c. ***Learn various specifications and components of the buildings.***

Unit – I

General items of work in Building: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

Unit – II

Rate Analysis: Rate Analysis – Working out data for various items of work over head and contingent charges.

Unit – III

Earthwork: Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

Unit – IV

Contracts: Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings- Standard specifications for different items of building construction.

Unit – V

Detailed Estimation: Detailed Estimation of Buildings using individual wall method.

Unit – VI

Detailed Estimation: Detailed Estimation of Buildings using centre line method.

Course Outcomes

Upon the successful completion of this course:

1. The student should be able to determine the quantities of different components of buildings.
2. The student should be in a position to find the cost of various building components.
3. The student should be capable of finalizing the value of structures.

Text Books:

1. 'Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.
2. 'Civil Engineering Contracts and Estimates' by B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd.

References:

1. ‘Standard Schedule of rates and standard data book’ by public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Environmental Impact Assessment and Management

(Elective-II)

Course Objectives:

The objective of this course is:

- ***a. To impart knowledge on different concepts of Environmental Impact Assessment.***
- ***b. To know procedures of risk assessment***
- ***c. To learn the EIA methodologies and the criterion for selection of EIA methods.***
- ***d. To pre-requisites for ISO 14001 certification***
- ***e. To know the procedures for environmental clearances and audit***
- ***f. To appreciate the importance of stakeholder participation in EIA***

Unit – I

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters – role of stakeholders in the EIA preparation –stages in EIA.

Unit – II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis - EIS and EMP.

Unit – III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives-application of remote sensing and GIS for EIA.

Unit – IV

Procurement of relevant soil quality: Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment:

Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

Unit – V

Assessment of Impact: Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.

Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment.

Unit – VI

EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation

objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.
Case studies and preparation of Environmental Impact assessment statement for various Industries.

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

1. Prepare EMP, EIS, and EIA report
2. Identify the risks and impacts of a project
3. Selection of an appropriate EIA methodology
4. Evaluation the EIA report
5. Estimate the cost benefit ratio of a project
6. Know the role of stakeholder and public hearing in the preparation of EIA

Text Books:

1. Environmental Impact Assessment, Canter Larry W.,McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.

References:

1. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers.
2. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K. Katania & Sons Publication, New Delhi.
3. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd., Delhi.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Advanced Structural Engineering

(Elective-II)

Course Objectives:

The objective of this course is:

- ***a. Familiarize Students with Raft Foundations and Retaining walls.***
- ***b. Equip student with concepts of design of different types of RCC water tanks.***
- ***c. Understand Concepts of flat slabs***
- ***d. Familiarize different types of Bunkers, Silos and Chimneys.***
- ***e. Understand different types of transmission towers.***

Unit – I

Analysis and Design of Raft Foundations: Analysis and Design of Raft Foundations – Design of RCC Retaining walls: Cantilever and Counter fort

Unit – II

Analysis and Design of Water Tanks: Analysis and Design of RCC Water Tanks, Circular and Rectangular types- Intze tank including staging.

Unit – III

Analysis and Design of Flat Slabs: Analysis and Design of Flat Slabs- Direct Design and Equivalent Frame Methods- Check for Punching shear.

Unit – IV

Analysis and Design of Bunkers: Analysis and Design of Bunkers and Silos- Concepts of Loading.

Unit – V

Analysis and Design of Chimney: Analysis and Design of Chimney, Concepts of loading

Unit – VI

Introduction to Transmission Towers: Introduction to Transmission Towers- Principles and procedures

Course Outcomes

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

1. Design raft foundations and different types of RCC retaining walls
2. Carryout analysis and design of different types of RCC water tanks
3. Solve the problems design of RCC Bunkers, Silos and Chimneys
4. Understand various types of transmission towers and loading on them.

Text Books :

1. 'Reinforced Concrete Structures' Vol-2 by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. 'Reinforced Concrete Structures' by N. Subrahmanian, Oxford Publishers
3. 'Design Drawing of Concrete and Steel Structures' by N. Krishna Raju University Press 2005.

References:

1. ‘Essentials of Bridge Engineering’ by D. Johnson Victor, Oxford and IBM publication Co., Pvt. Ltd.
2. ‘Reinforced concrete design’ by S. U, Pillai and D. Menon, Tata Mc.Grawhill Publishing Company

Codes: Relevant IS: codes.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Design and Drawing of Irrigation Structures

(Elective-II)

Course Objectives:

The objective of this course is:

a. ***Expose and acquaint students with different types of hydraulic structures, in minor and major irrigation systems and their functions.***
b. ***familiarize students with concepts of design of irrigation structures.***
c. ***Understand the different design parameters and types of structures.***
d. ***Familiarize students with established field practices in collection of data and operational requirements.***
e. ***Familiarize students in understanding the critical points in design of a major canal system.***

Design and drawing of :

1. Surplus weir.
2. Tank sluice with a tower head
3. Canal drop – Notch type.
4. Canal regulator
5. Under tunnel
6. Syphon aqueduct type III

Final Examination pattern : Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination is three hours.

Course Outcomes

Upon successful completion of this course, student will be able to

1. Work on different design formats and codes
2. Carry out design of minor or major irrigation structures, with specific study of location/situations.
3. Carryout the analysis or designs of masonry/concrete structures for tension, compression and stability.
4. Produce detailed drawings of designed structures as ready for construction.

Text Books :

1. Water resources engineering –principles and practice by C. Satyanarayana Murthy, New Age International publishers.
2. Irrigation, water power and water resources Engineering by Dr. K.R. Arora, Standard Publishing house, Delhi.

References:

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

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Traffic Engineering

(Elective-II)

Course Objectives:

The objective of this course is:

- ***a. To know various components and characteristics of traffic.***
- ***b. To know various traffic control devices and principles of highway safety.***
- ***c. To understand the detrimental effects of traffic on environment***
- ***d. To know highway capacity and level of service concepts.***
- ***e. To learn about intelligent vehicle highway systems.***

Unit – I

Components Of The Traffic System: Human-Vehicle–Environment System; characteristics of Road users, Vehicles, Highways and their classification; Traffic Studies:Inventories; Volume studies; Speed, Travel time and Delay studies; Intersection studies; Pedestrian studies; Parking studies; Accident studies.

Unit – II

Traffic Characteristics: Microscopic and macroscopic flow characteristics: Time headways; Temporal, spatial and model flow patterns; Interrupted and Un interrupted traffic. Microscopic and macroscopic speed characteristics: Vehicular speed Trajectories; Speed characteristics – Mathematical distribution; Speed and travel time variations; Travel time and delay studies.

Microscopic and Macroscopic density characteristics: Distance headway characteristics; Car-following theories; Density measurement techniques; Density contour maps.

Unit – III

Traffic Control Devices & Highway Safety: Traffic signs & Markings; Signal Warrants; Signal phasing and Development of phase plans; Fixed and Vehicle activated signals; Webster method; ARRB method; Drew's Method; IRC method; Signal coordination; Area Traffic control. Accident characteristics – Road – Driver – Vehicle; Accident recording and Analysis; Highway Safety Improvement Program; Safety Audit.

Unit – IV

Environmental Considerations: Air pollution: Kinds of pollutants; Air pollution standards; Measures of air quality; modelling and control. Noise pollution: Measurement of sound levels; Acceptable limits, Prediction of noise levels, Traffic noise control.

Unit – V

Highway Capacity And Level Of Service: Capacity and level of service; Factors affecting Capacity and LOS; Capacity of Rural Highways, Capacity of Urban Roads; HCM and IRC standards.

Unit – VI

Intelligent Vehicle – Highway Systems: Traffic surveillance and monitoring; IVHS programs, Role of IVHS, IVHS categories, Benefits and Costs of IVHS.

Course Outcomes

At the end of course, Student can

1. Determine traffic speed, volume, travel time and density.
2. Design traffic signals
3. Determine highway capacity

Text Books :

1. 'Traffic Engineering: Theory and Practice' by Pignataro LJ., Prentice hall, Inc.
2. 'Traffic and Transport planning' by Kadiyali L.R., Khanna Publishers.

References:

1. 'Traffic Engineering Hand Book' by Institute of Transportation Engineers, 4 Ed., Prentice Hall
2. 'Traffic Engineering' by Mc Shane, WR and RP Roess, Prentice Hall.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Advanced Foundation Engineering

(Elective-III)

Course Objectives:

The objective of this course is:

a. ***To enable the student to appreciate how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.***
b. ***To teach the student special methods of computation of settlements and the corrections to be applied to settlements.***
c. ***To enable the student to understand the advanced concepts of design of pile foundations.***
d. ***To teach the student the problems posed by expansive soils and the foundation practices appropriate to expansive soils.***
e. ***To enable the student to learn the difference between isolated and combined footings, the determination of bearing capacity of mats and proportioning of footings.***

Unit – I

Bearing capacity: Bearing capacity of Foundations using general bearing capacity equation – Meyerhof's, Brinch Hansen's and Vesic's methods.

Unit – II

Settlement analysis: Settlement analysis - Immediate settlement of footings resting on granular soils – Schmertmann & Hartman method – De Beer and Martens method - Immediate settlement in clays – Janbu's method – correction for consolidation settlement using Skempton and Bjerrum's method – Correction for construction period.

Unit – III

Mat foundations: Mat foundations – Purpose and types of isolated and combined footings – Mats/ Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils – compensated rafts.

Unit – IV

Earth-retaining structures: Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earth support methods – design of anchors – braced excavations – function of different components – forces in ties – stability against bottom heave.

Unit – V

Pile Foundations: Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils – Davisson and Gill method – Broms' analysis.

Unit – VI

Expansive Soils: Foundations in expansive soils – definitions of swell potential and swelling pressure – determination of free swell index – factors affecting swell potential and swelling

pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers – under-reamed piles – moisture control methods.

Course Outcomes

Upon successful completion of this course, student will be able to

1. Compute the safe bearing capacity of footings subjected to vertical and inclined loads.
2. Understand the advanced methods of settlement computations and proportion foundation footings.
3. Appreciate the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.
4. Appreciate the problems posed by expansive soils and the different foundation practices devised.
5. Appreciate the difference between isolated footings and combined footings and mat foundations.

Text Books :

1. 'Basic and applied soil mechanics' by Gopal Ranjan and ASR Rao, New Age Publishers.
2. 'Soil Mechanics and Foundation Engineering' by VNS Murthy, CBS Publishers.
3. 'Principles of Foundation Engineering' by BM Das, Thomson Brooks/Cole.

References:

1. 'Foundation Analysis and Design' by JE Bowles, John Wiley.
2. 'Foundation Design' by WC Teng, Prentice Hall Publishers.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Earthquake Resistant Design

(Elective-III)

Course Objectives:

The objective of this course is:

- ***a. Familiarize Students with Engineering Seismology***
- ***b. Equip student with concepts of Structural Dynamics***
- ***c. Understand Concepts of Seismic Design***
- ***d. Familiarize with Design philosophies for Seismic loading***
- ***e. Familiarize students with various IS codal provisions for ductile design and detailing***

Unit – I

Engineering seismology: Engineering seismology - rebound theory – plate tectonics – seismic waves - Earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

Unit – II

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – Formulation of the Equations of Motion– Elements of a Vibratory system – Degrees of Freedom – Oscillatory motion – Simple Harmonic Motion – Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor.

Unit – III

Seismic Design Concepts: Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames (MRF) – ductility of MRF – Infill wall – Nonstructural elements.

Unit – IV

Lateral Forces: Calculation of equivalent lateral force- Design Base Shear- Storey Shear, Estimation of Natural period of Structure, Computation of Response acceleration Coefficient- Zone factor- Seismic weight- Response reduction factors- Seismic Coefficient Method.

Unit – V

Ductility: Design and ductile detailing of Beams and columns of frames -Concept of strong column weak beams, Ductility criteria for earthquake resistant design, Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement, Shear reinforcement, Anchorage of reinforcement- Development length, Lap Splices.

Unit – VI

Seismic Analysis: Seismic Analysis and design of simple 2-storied RC Building frame – Equivalent static lateral force method and response spectrum method.

Course Outcomes

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

1. Explain fundamentals of Engineering Seismology
2. Acquaint with the principles Structural dynamics
3. Solve SDOF Systems and suggest ductile design
4. Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions

Text Books:

1. 'Earthquake Resistant Design of Structures' -Pankaj Agarwal and Manish ShriKhande, Prentice – Hall of India, 2007, New Delhi.
2. 'Earthquake Resistant Design of Building Structures' by Vinod Hosur, Wiley India Ltd.
3. 'Reinforced Concrete Design' by A. K. Jain.

References:

1. 'Introduction to the Theory of Seismology' by Bullen K.E., Great Britain at the University Printing houses, Cambridge University Press 1996.
2. Relevant code of practices.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Solid Waste Management

(Elective-III)

Course Objectives:

The objective of this course is:

a. ***To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste.***
b. ***To acquire the principles of treatment of municipal solid waste***
c. ***To know the impact of solid waste on the health of the living beings***
d. ***To learn the criterion for selection of landfill and its design***
e. ***To plan the methods of processing such as composting the municipal organic waste.***

Unit – I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

Unit – II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste

Collection of Solid Waste: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

Unit – III

Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

Unit – IV

Separation and Transformation of Solid Waste: unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

Unit – V

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

Unit – VI

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Course Outcomes

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

1. Design the collection systems of solid waste of a town
2. Design treatment of municipal solid waste and landfill
3. To know the criteria for selection of landfill
4. To characterise the solid waste and design a composting facility

Text Books:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993.

References:

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Pavement Analysis & Design and Evaluation

(Elective-III)

Course Objectives:

The objective of this course is:

a. ***To know various factors affecting pavement design***
b. ***To know various concepts for the stresses in pavements.***
c. ***To understand material characterisation and mix design concepts.***
d. ***To acquire design principles of flexible and rigid pavements.***
e. ***To acquire design principles of shoulders, overlays and drainage.***

Unit – I

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

Unit – II

Stresses In Pavements: ***Vehicle-Pavement Interaction:***Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements; ***Stress in Flexible Pavements:*** Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts; ***Stresses in Rigid Pavements:***Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars, Introduction to DAMA, KENLAYER & KENSLABS Programs.

Unit – III

Material Characterisation & Mix Design Concepts: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics; Marshall's and Hveem's Methods of Bituminous Concrete Mix Design, Field Implications of Stability and Flow Values, Introduction to Super Pave Mix Design, IRC Cement Concrete Mix Design.

Unit – IV

Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, Road Note No 29 & IRC Methods, Design of Runways & Taxiways, Design of Low Volume Rural Roads.

Unit – V

Design Of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design, Rigid Pavement Design for Low Volume Rural Roads.

Unit – VI

Design Of Shoulders, Overlays & Drainage: Shoulder Design Considerations, Traffic Prediction, Parking, Regular & Encroaching Traffic, Thickness Design Specifications for Flexible & Rigid Shoulders; Types & Design of Overlays: AI's Principal Component Analysis & IRC Methods of Overlay Design, Importance of Profile Correction Course; Pavement Drainage Concepts, Drainage Related Failures, Inflow-Outflow Concepts, Condition of Continuity, Surface and Sub Surface Drainage Design Specifications.

Course Outcomes

At the end of course, Student can

1. Design flexible and rigid pavements using various methods
2. Design shoulders, overlays and drainage.

Text Books :

1. 'Pavement Analysis and Design' by Yang H. Huang, Pearson Education, Second Edition.
2. 'Principles of Pavement Design' by Yoder.J. & Witczat Mathew, W. John Wiley & Sons Inc.
3. 'Pavement Design' by Srinivasa Kumar R, Universities Press, Hyderabad.

References:

1. 'Design of Functional Pavements' by Nai C. Yang, McGraw Hill Publications.
2. 'Concrete Pavements' by AF Stock, Elsevier, Applied Science Publishers.
3. 'Pavement and Surfacings for Highway & Airports' by Micheal Sargious, Applied Science Publishers Limited.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Soil Dynamics and Machine Foundations

(Elective-IV)

Course Objectives:

The objective of this course is:

a. ***The basic course in soil mechanics/geotechnical engineering generally introduces the fundamental concepts, principles and applications of soil as engineering material with properties under static loading.***
b. ***This course on 'Soil Dynamics' discusses***
c. ***About the fundamentals of vibrations***
d. ***about the behaviour and properties/response of soil as a material which is subjected to various types of dynamic or cyclic time dependent loadings.***
e. ***the design and analysis for machine foundations come along with this course to consider the dynamic properties of both soil and foundation as combined mass. Behaviour of various geotechnical structures such as shallow and deep foundations, retaining structures due to various types of time-dependent dynamic loading are discussed here along with the reference to design code provisions.***
f. ***Phenomena like liquefaction and lateral spreading of soil are also discussed.***
g. ***Discusses about the laboratory and filed tests to compute the dynamic soil properties of the soil mass.***

Unit – I

Introduction: Types of motion- SHM- Fundamental definitions- SDOF systems- Free and forced vibration with and without damping – Constant force and rotating mass type excitation –Types of damping-Equivalent stiffness of springs in series and parallel. – Resonance and its effect - magnification-logarithmic decrement –Transmissibility.

Unit – II

Vibration Analysis: Theories of Vibration Analysis- EHS Theory and lumped parameter model- Different modes of vibration- Natural frequency of foundation soil system – Barkan and IS methods – Pressure bulb concept – Reisner Theory – Limitations of Reisner theory – Sung's solutions -- Pauw's Analogy – Heigh's Theory.

Unit – III

Dynamic properties of soils: Dynamic properties of soils, Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.– Block vibration test – Determination of Damping factor.

Unit – IV

Types of machine foundations: Types of machine foundations – general requirements design – criteria for machine foundations, permissible amplitudes and bearing pressure Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.

Unit – V

Impact loading: Design data, design criteria, IS code provisions for the design foundations of Impact type of machines.

Unit – VI

Vibration Isolation: Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characterizes Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction - Dynamic bearing capacity, Earth retaining structures under dynamic loads.

Course Outcomes

On successful completion of these course, the student able to

1. Use theory of vibrations to find the behavior of soil under dynamic loading.
2. Design machine foundations under different loads and soil conditions.
3. Understand the liquefaction phenomina.
4. Conduct various laboratory and filed tests to determine the dynamic soil prosperities and its interpretation.
5. Design vibration isolators under any vibratory machines.

Text Books :

1. 'Vibrations of Soils and Foundations' by Richart Hall and Woods

References:

1. 'Vibration Analysis and Foundation Dynamics' by NSV Kameswara Rao, Wheeler Publishing, New Delhi.
2. 'Foundations of Machines- Analysis and Design' by Prakash and Puri.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Repair and Rehabilitation of Structures

(Elective-IV)

Course Objectives:

The objective of this course is:

a. ***Familiarize Students with deterioration of concrete in structures***
b. ***Equip student with concepts of NDT and evaluation***
c. ***Understand failures and causes for failures in structures***
d. ***Familiarize different materials and techniques for repairs***
e. ***Understand procedure to carryout Physical evaluation of buildings and prepare report.***

Unit – I

Deterioration of concrete in structures: Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive measures. - Cracks:Cracks in concrete, type, pattern, quantification, measurement & preventive measures.

Unit – II

Non Destructive Testing- Non destructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull out test, Core cutting- Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

Unit – III

Failure of buildings: Definition of building failure-types of failures- Causes of Failures-Faulty Design, Accidental over Loading, Poor quality of material and Poor Construction practices- Fire damage - Methodology for investigation of failures-diagnostic testing methods and equipments-repair of cracks in concrete

Unit – IV

Materials for repair and rehabilitation: Materials for repair and rehabilitation - Admixtures- types of admixtures purposes of using admixtures- chemical composition-Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo
methods- Ultrasound pulse velocity methods- Pull out tests.

Unit – V

Repair Techniques: Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Underpinning and under water repair; Materials, Equipments, Precautions and Processes.

Unit – VI

Investigation of structures: Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.

Course Outcomes

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

1. Explain deterioration of concrete in structures
2. Carryout analysis using NDT and evaluate structures
3. Assess failures and causes of failures in structures
4. Carryout Physical evaluation and submit report on condition of the structure.

Text Books:

1. 'Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B. Vidivelli, Standard Publishers.
3. 'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' by V. K. Raina.

References:

1. 'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Water Resources System Planning

(Elective-IV)

Course Objectives:

The course is designed to

a. ***Introduce the concepts of system analysis in the planning, design, and operation of water resources.***
b. ***Appreciate mathematical optimization methods and models.***
c. ***Learn and apply basic economic analysis tools to water resources projects.***
d. ***Understand linear, nonlinear and dynamic programming techniques and apply them to various water resources systems planning and design problems.***

Unit – I

Introduction: Concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

Unit – II

Linear programming: Formulation of linear programming models, graphical method, simplex method, application of linear programming in water resources, revised simplex method, duality in linear programming, sensitivity analysis.

Unit – III

Dynamic programming: Principles of optimality, forward and backward recursive dynamic programming, curse of dimensionality, application for resource allocation.

Unit – IV

Non-linear optimization techniques: Classical optimization techniques, Lagrange methods, Kuhn-Tucker conditions, Search techniques, overview of Genetic Algorithm

Unit – V

Water Resources Economics: Basics of engineering economics, economic analysis, conditions of project optimality, benefit and cost analysis

Unit – VI

Simulation and management: Application of simulation techniques in water resources, planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

Course Outcomes

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

1. Apply optimization methods to solve problems related to water resource systems.
2. Perform basic economic analysis to evaluate the economic feasibility of water resources projects

3. Formulate optimization models for decision making in water resources systems.
4. Use simulation models for planning and design of Water Resources Systems.

Text Books:

1. 'Water Resources System Analysis' by Vedula S and P P Mujumdar, McGraw Hill Company Ltd, 2005.
2. 'Water Resources Economics' by James D and R. Lee, Oxford Publishers, 2005.

References:

1. 'Water Resources Systems Planning and Management – An Introduction to Methods, Models and Applications'by Loucks D P and E V Bee,UNESCO Publications, 2005 (http://ecommons.cornell.edu/bitstream/1813/2804/21/00_intro.pd)
2. 'Optimal design of water distribution networks' by Bhave, P. R, Narosa Publishing house, 2003.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Urban Transportation Planning

(Elective-IV)

Course Objectives:

The objective of this course is:

- ***a. To learn various procedures for travel demand estimation .***
- ***b. To various data collection techniques for OD data.***
- ***c. To know various models and techniques for trip generation, trip distribution, mode choice and traffic assignment.***
- ***d. To develop alternative urban transport network plans.***

Unit – I

Urban Transportation Problems & Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach; Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

Unit – II

Data Collection And Inventories: Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

Unit – III

Trip Generation & Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models.

Unit – IV

Mode Choice Analysis: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

Unit – V

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

Unit – VI

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate

Alternative Improvements, Impacts of New Development on Transportation Facilities. Pivot Point Analysis, Environmental and Energy Analysis; Case studies

Course Outcomes

At the end of course, Student can

1. Estimate travel demand for an urban area.
2. Plan the transportation network for a city.
3. Identify the corridor and plan for providing good transportation facilities.
4. Evaluate various alternative transportation proposals.

Text Books:

1. 'Introduction to Urban System Planning' by Hutchinson, B.G., McGraw Hill.
2. 'Transportation Engineering - An Introduction' by Khisty C.J., Prentice Hall.
3. 'Fundamentals of Transportation Planning' by Papacostas, Tata McGraw Hill.

References:

1. 'Urban Transportation Planning: A decision oriented Approach' by Mayer M and Miller E, McGraw Hill.
2. 'Introduction to Transportation Planning' by Bruton M.J., Hutchinson of London.
3. 'Metropolitan Transportation Planning' by Dicky, J.W., Tata McGraw Hill.
4. 'Traffic Engineering and Transportation Planning' by Kadiyali.L.R., Khanna Publishers, New Delhi.

Web-Resources: www.nptel.com

*IV Year B.Tech. (CE). – II Sem*ester

Project Work

Course Objectives:

The main objective of the Project work is

a. ***To enable the student apply engineering knowledge that has been taught all through the programme for solving practical engineering problem.***
b. ***To enable the student capable for problem solving / problem shooting.***
c. ***To in still and inculcate team spirit/ team work in to the minds of the students.***
d. ***To enable/ train the students report making/ documentation.***
e. ***To provide students an opportunity to use any civil engineering software for their project work.***

Course Outcomes of the Project Work

Up on completion of the Project work, the student will be able to

1. Apply all levels of Engineering knowledge in solving the Engineering problems.
2. Work together with team spirit.
3. Use Civil Engineering software at least one.
4. Document the projects

*IV Year B.Tech. (CE). – II Sem*ester

INTELLECTUAL PROPERTY RIGHTS

Unit I

Introduction to Intellectual Property Law –Evolutionary past-Intellectual Property Law Basics-Types of Intellectual Property - Innovations and Inventions — Agencies Responsible for Intellectual Property –National & International

Unit II

Introduction to Copyrights – Principles of Copyrights – Subject Matters of Copyright – Rights Afforded by Copyright Law – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works – Rights of Distribution – Rights of Performers -— Infringement of Copyright -International Copyright Law

Unit III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law –Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation — Double Patenting – Patent Searching Patent Cooperation Treaty – New developments in Patent Law – Invention Developers and Promoters- International Patent Law

Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post Registration Procedures – Trade Mark maintenance – Transfer of rights – Inter Parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade mark claims –Trade Marks Litigation – International Trade Mark Law.

Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying state Law.

Unit VI

Introduction to Cyber Law – Information Technology Act 2000 – Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy – International aspects of Computer and Online Crime- Semiconductor Chip Protection Act.

REFERENCE BOOKS:

1. Deborah E.Bouchoux:"Intellectual Property". Cengage learning, New Delhi.

2. Kompal Bansal & Parishit Bansal “Fundementals of IPR for Engineers”, BS Pubilcations (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections.
4. Prabhuddha Ganguli: “Intellectual Property Rights” Tata Mc-Graw - Hill, New Delhi.
5. Richard Stim: “Intellectual Property”, Cengage Learning , New Delhi.
6. Dr.SR Mynani. Law & IP. Asian Law House, Hyderabad.
7. R.Radha Krishnan, S. Balasubramaniam: “Intellectual Property Rights, LANCO Publications, New Delhi.
8. M.Ashok Kumar and Mohd,Iqbal Ali: “Intellectual Property Right” Serials Publications.