Bapatla Engineering College

(*Autonomous*)

BAPATLA

B.Tech

Civil Engineering

Curriculum Effective from A.Y. 2018-19 (R18 Regulations)

Bapatla Engineering College:: Bapatla

(Autonomous underAcharyaNagarjuna University)

(Sponsored by Bapatla Education Society)

BAPATLA - 522102 Guntur District, A.P.,India

www.becbapatla.ac.in

BAPATLA ENGINEERING COLLEGE : BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

First Year B.Tech(SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA001	Linear Algebra and ODE	4	0	0	4	50	50	100	3
18PH002	Advanced Optics and Material Testing	4	1	0	5	50	50	100	4
18CE103	Introduction to civil Engineering	4	0	0	4	50	50	100	3
18EL001	Communicative English	3	0	0	3	50	50	100	2
18CE002	Biology for Engineers	3	0	0	3	50	50	100	2
18PHL01	Physics Lab	0	0	3	3	50	50	100	1
18ELL01	Communication Lab	0	0	3	3	50	50	100	1
18CSL01	Computer Programming Lab	2	0	3	5	50	50	100	2
	NCC/NSS/Internship/MOOCs								
	TOTAL	20	1	9	30	400	**400**	**800**	**18**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE : BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

First Year B.Tech(SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA002	Numerical Methods and Advanced Calculus	4	0	0	4	50	50	100	3
18CY001	Engineering Chemistry	4	0	0	4	50	50	100	3
18CE203	Engineering Mechanics	4	1	0	5	50	50	100	4
18CE001	Environmental Studies	3	0	0	3	50	50	100	2
18CE205	Electrical Technology& Mechanical Technology	4	0	0	4	50	50	100	3
18MEL01	Engineering Graphics	1	0	4	5	50	50	100	4
18CYL01	Chemistry Lab	0	0	3	3	50	50	100	1
18MEL02	Work Shop	0	0	3	3	50	50	100	1
	NCC/NSS/Internship/MOOCs								
	TOTAL	20	1	10	31	**400**	400	800	**21**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE : BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

Second Year B.Tech(SEMESTER – III)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18MA003	Probability and Statistics	4	0	0	4	50	50	100	3
18CE302	Surveying	4	1	0	5	50	50	100	4
18CE303	Solid Mechanics	3	1	0	4	50	50	100	3
18CE304	Building Materials, Planning and Construction	4	0	0	4	50	50	100	3
18CE305	Fluid Mechanics	3	1	0	4	50	50	100	3
18HU001	Indian Constitution	2	0	0	2	50	50	100	0
18CEL31	Building Drawing Lab	0	0	3	3	50	50	100	1
18CEL32	Engineering Geology Lab	2	0	3	5	50	50	100	2
18CEL33	Surveying Lab	0	0	3	3	50	50	100	1
	TOTAL	22	3	9	**34**	**450**	**450**	**900**	**20**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE : BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

Second Year B.Tech(SEMESTER – IV)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE401	Professional Practice, Law & Ethics	4	0	0	4	50	50	100	3
18CE402	Environmental Engineering	4	0	0	4	50	50	100	3
18CE403	Mechanics of Materials	3	1	0	4	50	50	100	3
18CE404	Hydraulics & Hydraulic Machines	3	1	0	4	50	50	100	3
18CE405	Concrete Technology	4	0	0	4	50	50	100	3
18EL002	Technical English	3	0	0	3	50	50	100	2
18CEII1	**Internship***	0	0	0	0	-	-	-	2
18CEL41	H & HM Lab	0	0	3	3	50	50	100	1
18CEL42	Environmental Engineering Lab	0	0	3	3	50	50	100	1
18CEL43	Materials Testing Laboratory	0	0	3	3	50	50	100	1
	TOTAL	21	2	9	32	450	450	900	22

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

*** Students will go to the Industry to identify the problem and survey the literature for a feasible solution. The work will be carried out during summer vacation after IV Semester.**

BAPATLA ENGINEERING COLLEGE : BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

Third Year B.Tech(SEMESTER – V)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE501	Structural Analysis	4	1	0	5	50	50	100	4
18CE502	Remote Sensing &GIS	4	0	0	4	50	50	100	3
18CE503	Design of Concrete Structures	4	1	0	5	50	50	100	4
18CE504	Design of Steel Structures	4	1	0	5	50	50	100	4
18CE505	Water Resources Engineering	4	0	0	4	50	50	100	3
18CE506	Soil Mechanics	4	0	0	4	50	50	100	3
18CEM01	**Self Learning Elective Course)* (MOOCS)**	0	0	0	0	50	50	100	2
18CEL51	Geographical Information System Laboratory	0	0	3	3	50	50	100	1
18CEL52	Soft Skills Laboratory	0	0	3	3	50	50	100	1
	TOTAL	24	3	6	33	**450**	**450**	**900**	**25**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

- **Students can opt any one of the self-learning courses prescribed by the Department. Students register and complete the opted course in approved MOOCS platform on or before the Last Instruction Day of V semester. They have to submit the certificate before Last Instruction Day ofVI semester**

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

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Effective FromtheAcademic Year2018-2019(R18 Regulations)

Third Year B.Tech(SEMESTER – VI)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE601	Estimation & Quantity Surveying	4	0	0	4	50	50	100	3
18CE602	Irrigation Structures	4	0	0	4	50	50	100	3
18CE603	Foundation Engineering	4	0	0	4	50	50	100	3
18CE604	Highway Engineering	4	0	0	4	50	50	100	3
18CED11…14	Elective-I	4	0	0	4	50	50	100	3
18CED21…24	Elective-II	4	0	0	4	50	50	100	3
18CEL61	Advanced Surveying Laboratory	0	0	3	3	50	50	100	1
18CEL62	Structural Analysis Design and Detailing Laboratory	0	0	3	3	50	50	100	1
18CEL63	Geo technical Engineering Laboratory	0	0	3	3	50	50	100	1
	TOTAL	24	0	9	33	450	450	**900**	**21**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE : BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

Final Year B.Tech(SEMESTER – VII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE701	Construction Management	4	0	0	4	50	50	100	3
18CED31…34	Elective-III	4	0	0	4	50	50	100	3
18CED41…44	Elective-IV	4	0	0	4	50	50	100	3
18—I--	Institution Elective-I	4	0	0	4	50	50	100	3
18CEP01	Project-I	0	0	5	5				2
18CEL71	Design and Detailing of Irrigation Structures Laboratory	0	0	3	3	50	50	100	1
18CEL72	Transportation Engineering Laboratory	0	0	3	3	50	50	100	1
18CEL73	Quantity Estimation & Project Management Laboratory	0	0	3	3	50	50	100	1
	TOTAL	16	0	14	30	**350**	**350**	**700**	**17**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

BAPATLA ENGINEERING COLLEGE : BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION (Semester System)

For

Civil Engineering

Effective FromtheAcademic Year2018-2019(R18 Regulations)

Final Year B.Tech(SEMESTER – VIII)

Code No.	Subject	Scheme of Instruction (Periods per week)				Scheme of Examination (Maximum marks)			No. of Credits
		L	T	P	Total	CIE	SEE	Total Marks	
18CE801	Engineering Economics & Management	4	0	0	4	50	50	100	3
18—I--	Institution Elective-II	4	0	0	4	50	50	100	3
18CED51…54	Elective - V	4	0	0	4	50	50	100	3
18CED61…64	Elective – VI	4	0	0	4	50	50	100	3
18CELP02	Project -II	0	0	24	24	75	75	150	10
	TOTAL	16	0	24	40	**275**	**275**	**550**	**22**

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lecture, T: Tutorial, P: Practical

Elective-I :

18CED11	**Advanced Structural Analysis**
18CED12	**Instrumentation and Sensor technology in Civil Engineering**
18CED13	**Sustainable Engineering & Technology**
18CED14	**Advanced Fluid Mechanics**

Elective-II:

18CED21	**Advanced Design of Structures**
18CED22	**Offshore Engineering**
18CED23	**Disaster preparedness and planning management**
18CED24	**Construction Engineering Materials**

Elective-III:

18CED31	**Pre stressed Concrete**
18CED32	**Environmental Geotechnics**
18CED33	**Low cost Housing Techniques**
18CED34	**Repair & Rehabilitation of Structures**

Elective-IV

18CED41	**Advanced Environmental Engineering**
18CED42	**Bridge Engineering**
18CED43	**Water Resources Field Methods**
18CED44	**Ground Improvement Techniques**

Elective-V :

18CED51	**Railway and Air Port Engineering**
18CED52	**Ground Water Development and Management**
18CED53	**Finite Element Analysis**
18CED54	**Solid and Hazardous Management**

Elective-IV :

18CED61	**Earthquake Resistant Design of Structures**
18CED62	**Environmental Impact Assessment and Management**
18CED63	**Pavement Analysis and Design**
18CED64	**Town planning and Architecture**

Open Elective-I & II:

The students of CE will choose an Inter department Elective offered by other Departments.

Open Electives offered by Civil Engineering Department

Open Elective-I: 1) Air Pollution & Control 2) Rural Water Supply and Environment Sanitation

Open Elective-II: 1) Disaster Management 2)RemoteSensing & GIS

Institutional Elective-I (in VII semester – position as 6th theory subject)

18CEI01: Air Pollution & Control
18CEI02: Rural Water Supply and Environment Sanitation
18CSI01: Java Programming
18CSI02: Database Management Systems
18ECI01: Consumer Electronics
18ECI02: Embedded Systems
18EEI01: Application of Wavelets to Engineering Problems
18EEI02: Industrial Electrical Systems
18EII01: Principles & Applications of MEMS
18EII02: Power System Instrumentation
18ITI01: Data Analytics
18ITI02: Cyber Security
18MEI01: Fluid Power and Control Systems
18MEI02: Project Management
18MAI01: Linear Algebra
18PHI01: Nano-Materials and Technology
18PHI02: Fiber Optic Communication
18HUI01: System Thinking
18ELI01: English for Competitive Examinations
18ELI02: Professional Communication

Institutional Elective-II (in VIII semester – position as 3rd theory subject)

18CEI03: Disaster Management
18CEI04: Remote sensing & GIS
18CSI03: Python Programming
18CSI04: Computer Networks
18ECI03: Artificial Neural Network
18ECI04: Internet of Things (IoT)
18EEI03: High Voltage Engineering
18EEI04: Energy Auditing and Conservation
18EII03: Robotics and Automation
18EII04: Advanced Computer Control Systems
18ITI03: Mobile Application Developments
18ITI04: Web Technology
18MEI03: Non-Conventional Energy Sources
18MEI04: Automobile Engineering
18MAI02: Graph Theory
18PHI03: Advanced Materials
18PHI04: Optical Electronics
18HUI02: Organizational Psychology
18HUI03: Telugu Modern Literature
18ELI03: English Through Media

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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STRUCTURAL ANALYSIS
III B.Tech – I Semester (Code : 18CE501)

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Learning Objectives

- Provide an analysis for three hinged arches and suspension bridges for different type of loads and their supports are at different levels.
- To analyze the statically indeterminate beams by using method of Consistent deformation.
- To impart concepts of force-displacement relations for evaluation of member end moments of beams and portal frames using the kinematic redundant.
- Introduce the concept of member stiffness, joint distribution factor, carry over moment and then balancing fixed end moments for beams, sway and non-sway frames by slope – deflection and moment distribution methods.
- The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads rolling on simply supported and continues girders and Pratt and Warren trusses.

Learning Outcomes

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

- Analyze the arches and Cables
- Analyze the Indeterminate beams using method of Consistent deformation
- Analyze the Indeterminate beams using Slope deflection method and Moment distribution method.
- Draw the influence lines for the determinate beams and trusses and also determine the maximum quantities using ILDs.

UNIT-I

1. Arches : Types, Eddy's Theorem; Analysis of three hinged Parabolic and Circular arches for Static loads. Effect of temperature changes in arches.

2. Cables Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self weight; Effect of temperature changes in suspension cables; Anchor cables.

UNIT-II

2. Analysis of indeterminate structures: Introduction to Force methods:

Statically indeterminate structures (method of consistent deformations): Applications for

i. Propped Cantilevers Analysis of propped cantilever by method of consistent deformations.

ii. Fixed Beams Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of support; Effect of rotation of a support; Bending moment diagram for fixed beams.

iii. Clapeyron's Theorem of Three Moments Analysis of continuous beams (Two span continuous beams).

UNIT-III

3. Analysis of indeterminate structures: Introduction to Displacement methods:

Kinematically indeterminate structures (slope-deflection method; moment distribution method),

i) Continuous beams for two spans only and

ii) Portal frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT-IV

4.**Influence Lines:** For Statically Determinate Structures Moving loads and influence lines; Influence lines for beam reactions; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

Text Books :

1.S.B,Junnarkar and H.J.Shah,' Mechanics of Structures,Vol. I & Vol. II' CharotarPublications,Anand,India

2. R. Vaidyanathan and P. Perumal, Structural Analysis Volume I & II, Laxmi Publications (P) Ltd., 2017 .
3. Reddy . C.S., Basic Structural Analysis, Tata McGraw Hill, 3e, 2011
4B.C.Punmia, Ashok Jain, ArunJain , Theory of structures SMTS-2, Laxmi Publications (P) Ltd., 2017 .
5. V. N. Vazirani& M. M. Ratwani ,Structural Analysis, Vol. II , Khanna Publishers, Delhi.

References:

1. Hibbeler, RC, Structural analysis, Pearson Education, 2012
2. Negi L. S. and Jangid R. S, Structural Analysis, Tata McGraw Hill, 1997
3. Rajasekaran S. and Sankarasubramanian G., Computational Structural Mechanics, PHI, 2008
4. S.S. Bhavikatti, Structural Analysis II, Vikas Publication Houses (P) Ltd, 2016
5. Timoshenko S. P. and Young D. H., Theory of Structures, McGraw Hill, 2e, 1965
6. Wang C. K., Intermediate Structural Analysis, Tata McGraw Hill, 1989

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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REMOTE SENSING & GIS
III B.Tech – I Semester (Code : 18CE502)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES:

- Learn basic concepts of Aerial Photographs.
- Learn basic concepts of remote sensing and its characteristics, satellite sensors andplatforms.
- Know about satellite digital image processing and classification techniques.
- Understand the basic concepts GIS, spatial data and analysis.
- applications of GPS in surveying.
- Know various remote sensing and GIS applications in civil engineering.

COURSE OUTCOMES:

- Interpret Information from Aerial Photographs.
- Exposure on Basics of Remote Sensing, Satellite Sensors and Platforms, Practical Knowledge on Satellite Image Classification.
- Know Basics of GIS And Map Making. Exposure About Spatial Analysis Using Overlay Tools.
- Geo-Tag Assets Using GPS And Add Attribute & Meta-Data.
- Get the Knowledge on Various Remote Sensing and GIS Applications in Civil Engineering.

UNIT- I

PHOTOGRAMMETRY

Fundamentals of Photogrammetry and Photo interpretation – types of photographs; Vertical photographs – principal point; scale; Stereoscopy; Vertical exaggeration –factors involved and determination; Overlap, side lap and flight planning.

UNIT – II

REMOTE SENSING

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere and target –

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, Space-borne remote sensing. Visual Interpretation Techniques.

Overview of Indian Remote sensing satellites and sensors, satellite definition and types, characteristics of satellite, characteristics of satellite orbit, characteristics of Indian satellites - IRS1A, IRS1B, IRS1C, IRS1D, CARTOSAT satellites.

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Introduction, key components, map projections, data entry &preparation – Spatial data input, Raster Data Model, Vector Data Model, Raster Vs Vector.advantages and dis advantages of Raster & Vector, Basic Overlay operations. network analysis - concept and types, Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis.

UNIT - IV

GLOBAL POSITIONING SYSTEM (GPS)&RS AND GISAPPLICATIONS:

GPS definition, components of GPS, GPS receivers.Space, Control and User segments of GPS.Advantages and disadvantages of GPS, Limitations and applications of GPS Indian Systems (IRNSS, GAGAN)Development of GPS surveying techniques, Navigation with GPS, Applications of GPS

Applications: Land use and Land cover, Watershed management for sustainable development, Agriculture, Forestry, Geology, Geomorphology, Urban Applications, Hydrology

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Chang, K. T. (2006). Introduction to Geographic Information Systems. The McGraw-Hill.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
4. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
5. Parkinson,B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications (Volume-I). AIAA, USA

REFERENCE BOOKS:

1. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
2. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt.Ltd, 2013.
3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prentice hall, New Jersey
4. Paul Wolf, Elements of Photogrammetry, McGraw Hill.
5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Interscience
6. Burrough, P. P. &McDonnel, R. A. (1998). Principles of GIS. Oxford University Press.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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DESIGN OF CONCRETE STRUCTURES
III B.Tech – I Semester (Code : 18CE503)

Lectures	4	Tutorial	1		Practical	0	Credits	4
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

OBJECTIVES:

The student will study and understand:

1. objectives of structural design, strength and serviceability concepts, and design Singly reinforced beams usingWSM and LSM.
2. shear effect and design for shear in beam, calculation of development length and complete design of beam usingLSM.
3. design of one-way slab, Two-way slab and dog-legged stair case by applyingLSM.
4. design of short and slender columns for axial, uniaxial and biaxial bendingusing LSM.
5. design of isolated and combined footings usingLSM.

OUTCOMES:

Students will be able to

1. understand the various design methodologies for the design of RCelements.
2. know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond andtorsion.
3. design various types of slabs and dog-legged staircase by limit statemethod.
4. designboth short and slender columns for axial, uniaxial and biaxial eccentricloadings.
5. designof Isolated and combined footings by limit statemethod.

** IS 456-2000 and IS SP-16 Charts are to be referred*

UNIT I

INTRODUCTION TO DESIGN OF BEAMS

Objective of structural design, Type of Loads on RCC Structures and Load combinations, Code of practices and Specifications, Design philosophies

Analysis and Design of Singly reinforced Rectangular beams by working stress method,

AnalysisandDesignofsinglyanddoublyreinforcedrectangularbeamsbyLimitStateMethod.

UNIT II

DESIGN OF BEAMS

Design of Flanged beams for Flexure, Behavior of RC members in Shear, Torsion, Bond and Anchorage, Check for development length by limit state method, Design of rectangular beam.

UNIT III

DESIGN OF SLABS AND STAIRCASE

Analysis and design of one-way simply supported slab, Design and Detailing of Two-way slabs, Design of Dog-legged Staircase.

UNIT IV

DESIGN OF COLUMNS

Types of columns, Axially Loaded columns, Design of short Rectangular Square and circular columns, Design of Slender columns, Design for Uniaxial and Biaxial bending using SP16 charts.

UNIT V

DESIGN OF FOOTINGS

Types of footings, foundations based on soil properties, Design of axially and eccentrically loaded Square.

NOTE

Two questions of 10 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1. Limit State Design of Reinforced Concrete by P. C. Varghese, Prentice Hall of India.
2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros.,Roorkee
3. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishinghouse
4. Reinforced Concrete Structures by N. Subramanian, Oxford University Press.

REFERENCES

1. Reinforced concrete design by Pillai and Menon, Tata McGraw-Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune VidyarthiGrihaPrakashan,Pune.
3. Reinforced concrete design: Principles and Practice by N. Krishna Raju., R. N. Pranesh, New Age International Publishers.
4. Reinforced Concrete Structure by R. Park., T. Paulay, Wiley India Publishers

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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DESIGN OF STEEL STRUCTURES
III B.Tech – I Semester (Code : 18CE504)

Lectures	4	Tutorial	1		Practical	0	Credits	4
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

(Using Limit State Method)

Course Objective:

The main objective of the subject is to make the students familiar with the behaviour and design of structural elements in accordance with the latest code of practice IS 800:2007 based on Limit State Design.

Course outcomes:

1. The students are able to understand the behaviour and design of simple connections efficiently and economically.
2. The students are able to design Tension and compression members efficiently and economically.
3. The students are able to design flexural members (Laterally supported and unsupported) efficiently and economically.
4. The students are able to design column bases along with connections.

UNIT – I

1.Introduction

Types of steels; Constructional steels; Mechanical properties; Design concepts; Fatigue behavior; Brittle fracture; Corrosion; Hot rolled sections;

2. Simple Connections

Advantages of welding; Welds; Types of welded joints; Weld specifications; Allowable stresses;Bolts; Black bolts; Failure modes of a joint; Pitch requirements of bolts; Allowable stresses;Efficiency of joint; High strength bolts; Lap andbutt joints, Truss joint connections;

UNIT – II

3. Tension Members

Introduction; Types of sections; Net area; Net effective area for angles and Tees; Design oftension members;

4. Compression Members

Introduction; Angle Struts; Effective length of a column; Allowable stresses; Types of sections;Built-up columns(using welding); Column splice (using welding)

UNIT – III

5. Column Bases

Slab base; Gusseted base; Eccentric bases;

UNIT – IV

6. Beams

Introduction; Laterally supported beams; Built-up beams (using welding); lateral buckling ofbeams; Design of laterally supported beams; Secondary design considerations; Grillagebeams; Design of laterally unsupported beams;

UNIT – V

7. Eccentric Connections (Using Welding)

Simple beam end connections – Seat connections; Bracket connections;

NOTE

Two questions of 10 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1**.** Limit state design of steel structures by S.K.Duggal, Tata McGrawhill,Publishing company Ltd.
2**..**Design of Steel structures by N.Subramanian, Oxford University press,2009
3. Limit state design of steel structures by Ramachandra, VeerendraGehlot, Scientific Publications.
4. Design of Steel Structures by Limit state method as per IS800-2007 by K.LSairam, Pearson Education India

REFERENCES:

1.Design of Steel Structures by Limit state method as per IS800-2007 by S.S.Bhavakatti, IK International Publishing Housing Pvt.Ltd.
2. Analysis and Design Practice of Steel Structures by Karuna Moy Ghosh, Prentice Hall of India Publishers.
3.Structural steel design by M.L.Gambhir , Tata McGraw-Hill Education

Codes

1. IS 800-2007

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

WATER RESOURCES ENGINEERING
III B.Tech – I Semester (Code: 18CE505)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Prerequisites: Fluid Mechanics [18CE305]
Hydraulics & Hydraulic Machines [18CE404]

Course Objectives:
CO1: To explain components of hydrology and use of hydrographs in measuring rainfall&runoff
CO2: To determine various parameters in ground water hydrology and design of channels
CO3: To explaindesign of lined canal, water logging and canal regulation works
CO4: To explain various methods and requirements of irrigation water

Course Outcomes: Student will be able to
CLO1: Determine flows from hydrology concepts and evaluate runoff from hydrographs
CLO2: Differentiate various parameters in ground water engineering and to develop design of irrigation channels
CLO3: Design a lined canal and to differentiate various canal regulation works
CLO4: Asses various water needs of the crops

UNIT – I

1. Hydrology

Hydrologic cycle; Precipitation types; Rain gauges; Computation of average rain fall over a basin; factors affecting evaporation Infiltration, infiltration and Run off; Computation of run off.

2. Hydrographs

Hydrograph analysis; Unit hydrograph; Application of Unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; Application of Unit hydrograph to construction of a flood hydrograph resulting from two or more periods of rainfall; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration by superposition method and S-curve method.

UNIT – II

3. Ground Water – Well Irrigation

Introduction; Aquifer; Aquiclude; Aquifuge; Specific yield; Specific retention; Divisions of sub– surface water; Water table; Types of aquifers; Well hydraulics; Steady radial flow to a well–Dupuit's theory for confined and unconfined aquifers; Yield of an open well– Constant level pumping test, Recuperation test.

4. Channels – Silt Theories & Design Procedure

Cross section of a channel; Balancing depth; Silt theories–Kennedy's theory, Lacey's regime theory; Kennedy's method of channel design; Lacey's theory applied to channel design.

UNIT – III

5. Water logging&Canal Lining

Effects of water logging; Causes of water logging; Remedial measures; Lining of irrigation channels – necessity, advantages and disadvantages; Design of lined canal.

6. Canal outlets and regulation works

Types of outlets; Canal falls; Necessity and location of falls; Classification of falls.Types of regulators and functions of cross and head regulators.

UNIT – IV

7. Introduction to Irrigation: Types and Methods of irrigation,Benefits of irrigation; Ill-effects of irrigation;

8. Water Requirement of Crops: Functions of irrigation water; Classes and availability of soil water; Saturation capacity; Field capacity; Wilting point; Available moisture and readily available moisture; Moisture equivalent; Soil moisture deficiency; Limiting soil moisture conditions; Depth and frequency of irrigation; Duty and Delta; Base period; Relation between Duty and Delta; Factors affecting duty; Methods of improving duty; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; kor depth and kor period; Determination of irrigation requirements of crops; crop rotation.

TEXT BOOKS:

1. Irrigation and water power Engineering by Dr. B.C. Punmia& Dr. Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS:

1. Irrigation, Water Resources & Water Power Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, New Delhi
3. Engineering Hydrology by K. Subramanya, TMH Publishers
4. Engineering Hydrology by P. Jayarami Reddy, Laxmi Publications
5. Irrigation Engineering and Hydraulic Structures by S.R. SahasraBudhe; Katson Publishing House, Ludhiana

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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SOIL MECHANICS
III B.Tech – I Semester (Code : 18CE506)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES:

CO1: To enable the student to understand the concept of soil formation
CO2: To enable the student to determine index properties of soils and identify the type of soil
CO3: To enable the student to understand the concept of soil structure and various soil classification systems
CO4: To enable the student to understand various laboratory and field tests to determine coefficient of permeability
CO5: To impart the concept of seepage of water through soils and effective stress principle , determine discharge of water through soils
CO6: To enable the student to understand the principles and methods of compaction to determine degree of compaction of soils
CO7: To enable the student to understand the principles of consolidation , determine magnitude and rate of consolidation settlement
CO8: To enable the student to understand the concept of shear strength of soils, determine shear parameters and shear strength of soil using various laboratory tests

COURSE OUTCOMES:

CLO1: The student must know the concept of origin and formation of soils
CLO2: The student must know the determination of various quantities or index properties related to soil mechanics and establish their interrelation ships
CLO3: The student should be able to classify soils
CLO4: The student should be able to determine coefficient of permeability using laboratory and field tests
CLO5: The student must know the concept of seepage of water through soils and determine effective stress and total stress at any point in soils
CLO6: The student should be able to determine dry densities and degree of compaction for cohesive and granular soils
CLO7: The student must recognize the importance of consolidation on settlement of footings
CLO8: The student must recognize the importance of shear strength in determining load carrying capacity of soil using shear parameters

UNIT – 1

1. Introduction

Soil formation and soil types; Regional soil deposits of India

2. Basic Definitions And Relations

Phase diagrams; Simple definitions; some important relationships;
Index Properties; Grain size distribution; Atterberg Limits; Significance of other Soil Aggregate properties

UNIT – II

3. Soil Classification

Clay Mineralogy: Introduction to soil classification; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system

4. Permeability

Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and Variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits. ;

UNIT – III

5. Seepage through Soils

Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition

6. Compaction of Soils

Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behavior of Compacted cohesive soils; Compaction in the field; Compaction specifications and field
control.

UNIT – IV

7. Compressibility of Soil And Consolidation

Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of Settlement; extrapolation of field consolidation curve; Settlement analysis.

8. Shear Strength Of Soils

Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage
conditions and Strength parameters.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics – GopalRanjan and A.S.R.Rao, New Age International Publishers

2. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.PunmiaLaxmi Publications
4. A Text book of Soil Mechanics and Foundation Engineering – K.R.Arora, Standard Publishers &Distributors, New Delhi
5. A Text book of Soil Mechanics and Foundation Engineering – P.Purushotthama Raj, Pearson Education
6 . Introduction to Soil Mechanics- Braja M Das

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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SELF LEARING ELECTIVE COURSE (MOOCS)
III B.Tech – I Semester (Code : 18CEM01)

Lectures	0	Tutorial	0		Practical	0	Credits	2
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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GEOGRAPHICAL INFORMATION SYSTEM LABORATORY
III B.Tech – I Semester (Code : 18CEL51)

Lectures	0	Tutorial	0		Practical	3	Credits	1
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

LABORATORY OBJECTIVES:

1. Understand the process of Digitization of maps
2. creation of various features thematically
3. Develop the DEM
4. Learn external data linkages to internal features
5. Learn GIS analysis.
6. Learn GIS data base quarries

LABORATORY OUTCOMES:

CO1: Exposure of Geospatial data base creation and Map features
CO2: Thematic maps Preparation
CO3: Assess the various digitized features
CO4: Exposure of creating features from external data.
CO5: Know how to make a query's in GIS environment.
CO6: Know the overlay use ages in GIS.

LIST OF EXPERIMENTS:

- EXP1: Digitization of toposheet
- EXP2: Creation of thematic maps.
- EXP3: Estimation of features and interpretation
- EXP4: Developing Digital Elevation Model (DEM)
- EXP5: Linking external data base (.CSV, or. EXCEL, or .Txt) to internal features
- EXP6: Buffers creation around (Point, line, and polygon) Features
- EXP7: Create point features using excel data
- EXP8: Querying on attribute data
- EXP9: Overlay Operations (Identity, or Intersect or Union or erase)any two
- EXP10: Vector to raster creation (Features conversion, Point, polyline and polygon)
- EXP11: Raster to vector conversion (Line or polygon options)
- EXP12: Preparation of Flow Accumulation, Flow direction maps (using DEM)

***Any 10 Experiments**

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

SOFT SKILLS LABORATORY
III B.Tech – I Semester (Code : 18CEL52)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives

- to understand facial expressions, gestures and postures for effective communication
- to understand the importance of interpersonal and intrapersonal skills in an employability setting
- to understand the process of thinking and analytical skills ethically
- to understand team skills and its effectiveness in inculcating leadership qualities

UNIT-I

1. Body Language & Identity Management

a. Facial Expressions – Kinesics - Occulesics
b. Haptics - Proxemics
c. Para Linguistics
d. Appearance
e. Identity Management Communication

2. Emotional Intelligence & Life Skills

a. Self Awareness through Johari Window and SWOC analysis
b. Self Motivation
c. Empathy
d. Assertiveness & Managing Stress
e. Positive Attitude
f. Time Management
g. Goal Setting: Short term, Long Term, Vision, Mission.

3.Business Presentations

a. Preparing effective Presentations Power Point Presentations
b. Power Point Presentations
c. Using Visual Aids
d. Mock Presentations

4.Employability Skills

a. Group Discussion
b. Team Building and Leadership Qualities
c. Interview Skills

Reference Books:

- Personality Development and Soft skills (Second Edition), Barun K. Mithra. Oxford University Press: 2016
- The Definitive Book of Body Language, Allan & Barbara. Pease International:2004
- Working with Emotional Intelligence, Daniel Goleman. Bloomsbury:1998
- English for Jobseekers, LinaMukhopadhyay. Cambridge University Press:2013
- The 7 Habits of Highly Effective People, Stephen R.Covey. St. Martin's Press:2014

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

ESTIMATION & QUANTITY SURVEYING
III B.Tech – II Semester (Code : 18CE601)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Pre-requisite: Building Planning and Drawing

COURSE OBJECTIVES:

CO1 : To Estimate the various types of Buildings.
CO2 : To Prepare the Detailed Estimation for RCC, Road.
CO3 : To Construct the Specifications for a Building and Evaluate the Rate per unit item of different works.
CO4 : To discuss the PWD accounts and Procedures of works.

COURSE LEARNING OUTCOMES: At the end of the course student will be able to

CLO1 : Acquire the knowledge of the drawings, procedures and different estimating methods of Buildings.
CLO2 : Estimate Quantities of RCC and Road works.
CLO3 :Recognise the importance of specifications and estimate the unit Rate for different engineering works.
CLO4 : Gain knowledge on PWD accounts and Procedure of works like tendering.

UNIT – I

1. Procedure of Estimation

Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

2. Methods of building estimates

Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

3. Estimate of Buildings

Estimate of residential building; Estimate of a building from line plan.

UNIT – II

4. Estimate of RCC works

Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC column with foundation.

5. Road Estimating
Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.

UNIT – III

7. Specifications
Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring, R.R.Stone Masonry.

8. Analysis of Rates
Task or out – turn work; Labour and materials required for different works; Rates of materials andlabour; Preparing analysis of rates for the following items of work:
i) Concrete ii) RCC Works iii) Brick work in foundation and super structure
iv) Plastering v) CC flooring vi) White washing.

UNIT – IV

9. PWD Accounts and Procedure of Works
Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

10. Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, pre bid qualification. General and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes.Arbitration.

11. Miscellaneous:
Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage, brief outlines of valuation process.

NOTE
Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Estimating & Costing in Civil Engineering by B.N. Dutta; U. B. S. Publishers & Distributors, New Delhi.
2. Valuation of Real properties by S. C. Rangwala; Charotar Publishing House, Anand
3. FIDIC Contract Conditions.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

IRRIGATION STRUCTURES
III B.Tech – II Semester (Code : 18CE602)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Prerequisites: Fluid Mechanics [18CE305]
Hydraulics & Hydraulic Machines [18CE404]
Water Resources Engineering [18CE505]

Course Objectives:

CO1: To study various methods measurement of water and Reservoir planning
CO2: To design a Gravity dam
CO3: To understand various types of earth dams and spillways
CO4: To describe various types of cross drainage works and head works

Course Outcomes: Student will be able to

CLO1: Identify various methods of stream gauging and Reservoir Planning
CLO2: Design and analyze gravity dam
CLO3: Differentiate various types of earth dams and spillways
CLO4: Knowvarious types of cross drainage works and head works

UNIT – I

1.Stream gauging - Discharge measurement- Area-Velocity method; Slope Area method; Measurement of velocity; Floats – Surface floats, Sub–surface float or Double float, Velocity rod or Rod float; Pitot tube; Current meter.

2. Reservoir Planning: Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; flood routing.

UNIT – II

3. Dams in General: Introduction; Classification; Physical factors governing selection of type of dam.

4.Gravity Dams - Introduction; Forces acting on a gravity dam; Modes of failure and criteria for stability requirements; Stability analysis; Elementary Profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams; Design of gravity dams.

UNIT – III

5. Earth dams: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams.

6. Spillways: Introduction; Types of spillways; Energy dissipation below spillways, Stilling basins.

UNIT – IV

7. Diversion Head Works- Component parts of a Diversion Head work; Weirs and barrages- Types of weirs; Causes of failure of weirs and their remedies; Design of weirs on permeable foundations –Bligh's creep theory.

8. **Cross Drainage Works -**Introduction; Types of cross drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts.

TEXT BOOKS:

1. Irrigation and water power engineering by Dr. B.C. Punmia& Dr. Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS:

1. Irrigation, Water Resources & Water Power Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers,New Delhi
3. Irrigation Engineering and Hydraulic Structures by S.R. SahasraBudhe; Katson Publishing House, Ludhiana

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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FOUNDATION ENGINEERING
III B.Tech – II Semester (Code : 18CE603)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES:

CO1: To enable the students to acquire proper knowledge about soil exploration and various principles of important field tests such as SPT, plate bearing test etc

CO2: To enable the students to acquire knowledge of various earth pressure theories and determination of resultant thrust acting on earth retaining walls

CO3: To impart the students in depth knowledge about various types of slopes and methods for their stability analysis

CO4: To impart the students in depth knowledge in analyzing the stress at any point below the ground surface due to self weight and externally applied load

CO5: To impart the students knowledge of types of shallow foundations and theories required for determination of bearing capacity of soils

CO6: To enable the students to understand the principle of consolidation, to compute immediate and consolidation settlements of shallow foundations and determining bearing capacity of soils based on settlement criteria

CO7: To enable the students to imbibe the concepts of pile foundations and determine their load carrying capacity based on suitability of soils

CO8: To impart the students knowledge of well foundations and analysis of forces acting on caissons, acquire knowledge of expansive soils

COURSE OUTCOMES:

CLO1: The student should be able to know various methods of soil exploration and field tests such as penetration tests, geophysical methods

CLO2: The student should be able to know various earth pressure theories applicable to analysis and design of earth retaining walls

CLO3: The student should be able to know different methods of slope stability analysis

CLO4: The student should be able to know the determination of vertical stress at any point below ground surface

CLO5: The student must be able to understand various types of shallow foundations and decide their location based on soil characteristics, determination of bearing capacity of soils based on shear criteria

CLO6: The student must be able to compute magnitude of foundation settlement and decide size of the foundation accordingly, determine bearing capacity based on settlement criteria using field test data

CLO7: The students must be able to apply the principles of bearing capacity of piles and design them accordingly

CLO8: The students must be able to analyse and design well foundations and under reamed pile foundations

UNIT – I

1. Sub–Soil Investigation And Sampling

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field tests vis-à-vis Laboratory tests; Plate load test; Penetrometer tests; Geophysical
methods; Borehole logs; Site investigation report;

2. Lateral Earth Pressure & Retaining Walls

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls;

UNIT - II

3. Stability Of Slopes

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes - forms of slip surface; Total stress and Effective stress methods of analysis; □ u=0 Analysis (Total Stress Analysis) ; c-□ □ Analysis Method of slices; Location of most Critical Circle; Stability of Earth
Dam Slopes; Friction Circle Method; Taylor's Stability Number;

4. Vertical Stresses below Applied Loads

Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newark's influence chart; Approximate stress distribution methods for loaded areas; Westergaard's equation

UNIT -III

5. Bearing Capacity Of Shallow Foundation

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation. Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi's Bearing Capacity theory; Skempton'sBearing
Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity;

6. Settlement Analysis

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlemtent –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods;

UNIT – IV

7. Pile Foundations

Introduction; Uses of Piles; Types of Piles; Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction;

8. Well Foundations

Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells;

9. Foundations In Expansive Soils

Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils

Text Books:

1. Basic and Applied Soil Mechanics – GopalRanjan and A.S.R.Rao, New Age International Publishers

2. Foundation Engineering by B. J. Kasmalkar; Pune VidyarthiGrihaPrakashan, Pune
3. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
4. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
5. Geotechnical Engineering by SK Gulati&ManojDatta, Tata McGraw- Hill Publishing Company Limited.
6. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore
7. Geotechnical Engineering, - Codutu, Pearson Education

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

HIGHWAY ENGINEERING
IV B.Tech – I Semester (Code : 18CE604)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Prerequisites: Surveying (18CE302)
Soil Mechanics (18CE506)

Course Objectives:
CO1: To discuss the principles of planning and geometric design of highways.
CO2: To discuss the traffic flow characteristics.
CO3: To assess the properties of highway construction materials and design the flexible and rigid pavements.
CO4: To explain the construction and maintenance techniques used in the different pavement layers.

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Course Outcomes: Student will be able to
CLO1: Design various road geometric elements.
CLO2: Asses the traffic flow characteristics and traffic operations.
CLO3: Evaluate suitability of pavement materials and determine the crust thickness of the pavement.
CLO4: Identify the causes for distresses in the pavement layers.

UNIT-I

1. HIGHWAY NETWORK PLANNING AND ALIGNMENT

Introduction to Transportation Systems and Different Modes of Transportation, Road Classification, Road Patterns, 20 Year Road Development plans. Current road projects in India; Highway Alignment: Requirements, factors controlling, Engineering Surveys.

2. HIGHWAY GEOMETRIC DESIGN

Geometric Design: Highway Cross Section Elements - Friction, Unevenness, Camber, Carriageway Width, Kerbs, road margins, formation width, right of way, Sight Distance-Stopping Sight Distance, Overtaking Sight Distance, Intermediate Sight Distance, Design of Horizontal Alignment- Super elevation, transition curves, extra widening, set back distance, Design of Vertical Alignment-Grades and Grade Compensation, Types of Vertical curves and design.

UNIT-II

3. TRAFFIC STUDIES

Introduction, Road User Characteristics, Vehicle Characteristics, Traffic Volume Studies, Speed Studies, Origin and Destination Studies, Traffic Flow Characteristics, Traffic Capacity and Level of Service.

4. DESIGN OF TRAFFIC CONTROL DEVICES

Traffic Operations-Traffic Regulation, Traffic Control Devices- Markings, Signs, Signals, Rotary Intersection.

UNIT-III

5. PAVEMENT MATERIALS

Pavement types and components of a pavement structure; characterization of different pavement materials including: subgrade soil, aggregates, bitumen, modified bitumen, cutback bitumen, and emulsion; Different grading systems for bitumen; Marshall method of bituminous mix design.

6. DESIGN OF PAVEMENTS

Design of pavements- Introduction; flexible pavements, factors affecting design and performance; design of flexible pavements as per IRC-37; rigid pavement components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC-58.

UNIT-IV

7. HIGHWAY CONSTRUCTION AND MAINTENANCE

Construction Steps of Embankment, Sub Grade, Granular Sub Base (GSB), Wet Mix Macadam (WMM), Dense Bituminous Macadam (DBM), Bituminous Concrete (BC), Dry Lean Concrete (DLC), Pavement QualityConcrete (PQC), failures in flexible pavement, failures in rigidpavements, maintenance of Bituminous pavements and concrete pavements.

Text Books

1. Khanna, S. K., C. E. G. Justo, A.Veeraragavan"Text book on Highway Engineering." Nem Chand Bros, Roorkee (2014).10th Edition.

2. Principles and practices of Highway Engineering (2013), L R Kadiyali; N B Lal,Khanna Publishers, NaiSarak, Delhi

Reference Books

1.Principles of Transportation Engineering by ParthaChakroborthy&Animesh Das; Prentice Hall ofIndia, New Delhi.

2.Ministry of Road Transport and Highways- Specifications for Roads and Bridge Works, Fifth Revision, IRC, New Delhi, India-2013

3.IRC 37:2018- Guidelines For The Design of Flexible Pavements(Third Revision)

4. IRC58-2015 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways

NPTEL :

http://nptel.ac.in/courses/105101087/
http://nptel.ac.in/courses/105105107/

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - I

ADVANCED STRUCTURAL ANALYSIS
III B.Tech – II Semester (Code : 18CED11)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

1. To understand the methods of analysis of indeterminate trusses for external loads, lack of fit and thermal effect using strain energy concept
2. To study behavior of arches and their methods of analysis
3. To know the concept and analysis of cable stayed bridge.
4. To understand the non-linear elastic behavior of beams and rigid jointed frames for external loads
5. To study the analysis of continues beams using matrix approach.
6. To analyze the portal frames and multi-storey frames subjected to vertical loads by kani's method or substitute frame method and frames subjected to lateral loads by portal/cantilever method.

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

- Demonstrate the behavior of arches and their methods of analysis and analyze cable suspension bridges
- Analyze the continuous beams, Frames carrying ultimate loads using plastic analysis approach. method.
- Analyze the continuous beams, Frames and trusses using flexibility method.
- Analyze the continuous beams, Frames and trusses using stiffness method.
- Analyse the multi storey frames subjected to lateral and gravity loads by approximate methods.

UNIT-I

1. **Strain Energy Method:** Strain energy method for analysis of continuous beams and rigid joined plane frames (Dof : 2) and two hinged arches up to single degree redundancy. (Castigliano's theorem-II).

2. **Redundant Pin Jointed Frames:** Analysis of pin jointed frames (one degree redundancy); Forces in indeterminate pin jointed frames due to temperature variation and lack of fit;

UNIT-II

3. Plastic Behavior of Structures
Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of memberscarrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of

fullyplasticmoment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapseload analysis of indeterminate beams and single bay, single storied portal frames.

UNIT – III

4. Multi Storey Frames (Approximate Methods) Substitute frame method for gravity loads; Portal method and cantilever method for lateral loads.

5. **Kani's Method** Principles of the method; Application to continuous beams and portal frames (single bay, single storey with vertical legs only) without and with side-sway.

UNIT – IV

6. Introduction to Matrix Methods

Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix.

7. Analysis of Continues beams

Analysis of continuous beams by Flexibility method and stiffness matrix method, (up to 2 Dof).

Text Books :

1. R. Vaidyanathan and P. Perumal, Structural Analysis Volume I & II, Laxmi Publications (P) Ltd., 2017 .
2. B.C.Punmia, Ashok Jain, ArunJain , Theory of structures SMTS-2, Laxmi Publications (P) Ltd., 2017 .
3. V. N. Vazirani& M. M. Ratwani ,Structural Analysis, Vol. II , Khanna Publishers,Delhi.

References:

1.V.K. ManickaSelvam, Fundamentals Of Limit Analysis Of Structures (A Course In Plastic Analysis Of Structures), DhanpatRai Publications,2012.
2. Matrix analysis of framed structures by Weaver &Ger

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - I

INSTRUMENTATION AND SENSOR TECHNOLOGY IN CIVIL ENGINEERING
III B.Tech – II Semester (Code : 18CED12)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. To introduce the basics of measurements. To elucidate sensors and signal conditioning circuits.
2. To introduce different error analysis methods. To familiarize with different sensors and transducers &To explain signal conditioning circuits.
3. To understand concepts of acquiring the data from transducers/input devices, their interfacing and instrumentation system design.
4. To familiarize with different data transfer techniques.

Course Learning Outcomes (CLO):

After the completion of the course student will be able to:

1. Illustrate the different methods for the measurement of length and angle
2. Elucidate construction & working of various industrial devices used to measure pressure, sound & flow
3. Explicate the construction and working of various industrial devices used to measure temperature, level, vibration, viscosity and humidity
4. To analyse, formulate and select suitable sensor for the given industrial applications & summarize different methods for level measurement

UNIT – I

Introduction: Basic definitions related to measurements/ Instrumentation, Block diagram ofgeneralized measurement / Instrumentation system.

Static characteristics of instruments: Introduction, static characteristics: accuracy, precision, resolution, static sensitivity, Linearity,Threshold, Hysteresis, Dead Zone, span, Range Loading effect.

Dynamic characteristics: Generalised Mathematical model of measurement system,operational & sinusoidal transfer functions zero, first and second order instruments & their responseto step, ramp, and impulse inputs.

UNIT – II

Errors in Measurements: Static error, Types of errors, estimation of static errors: limiting errors &their combinations, error estimates from the normal distribution, probable errors& theircombinations statistical analysis of measurement data uncertainty analysis curve fitting: Method ofleast squares.

Introduction: Definition of Transducer, Classification of transducers.
Resistive Transducers: Potentiometers, straingauges & their types, RTD's, thermistors, Hotwireanemometers.

Inductive Transducers: Transducers type, electromagnetic type, Magnetostrictivetype, Variable reluctance type, (or) Variable permeability type.
Capacitive Transducers: Variabledielectric, Variable gap, Variable area type Capacitive devices, Differential type.

UNIT – III

Piezo-electric Transducers: Piezo-electric effect, Piezo-electric Materials, Piezo-electric transducer &its characteristics.
Radiation Transducers: Radiation Pyrometry, Radiation fundamentals Radiation Pyrometer, Totalradiation pyrometer, selective radiation pyrometer, Twocolour radiation pyrometers.

UNIT-IV

Signal and System Analysis: Introduction, Analog Filters and frequency analysers, Frequency analysis for various input signals, digital frequency analysers, system analysis by Harmonic testing, system analysis by Transient testing

Condition Monitoring and Signature Analysis Applications: Introduction, Vibration and Noise Monitoring, Temperature Monitoring, Wear Behaviour Monitoring, Corrosion Monitoring, Performance Trend Monitoring, Selection of Condition Monitoring Techniques.

TEXT BOOKS:

1. BC Nakra&KKChaudhry, Instrumentation, Measurement and Analysis 2nd Edition,TMH
2. AK Ghosh, Introduction to Instrumentation and Control (PHI)

REFERENCE BOOKS:

1. Allan s Morris, Principles of Measurement systems (PHI)
2. A.K.Sawheny, Electrical & Electronic Measurements and InstrumentationDhanpathRai
3. JB Guptha, Electrical & Electronic Measurements and Instrumentation, S.K.Kataria
4. E.O.Doeblin, Measurement systems: Applications and Design,TMH
5. D.V.S Murthy, Transducers & Instrumentation, PHI
6. D.S.Kumar, Mechanical Measurements, Metro Politan

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - I

SUSTAINABLE ENGINEERING & TECHNOLOGY
III B.Tech – II Semester (Code : 18CED13)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. To develop an awareness on issues in areas of sustainability.
2. To establish the role and impact of engineering activities and engineering decisions on environmental, societal, and economic well-being.
3. To give familiarity with the methods and tools used for sustainable product-service system development
4. To understand the role of engineering and technology within sustainable development.

Course Outcomes:

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

1. Increased awareness on issues in the area of sustainability
2. Gain an understanding of the role and impact of engineering activities and engineering decisions on the environment, society, and economics
3. Gain familiarity with the methods and tools employed for sustainable product-service system development.
4. Understand the role of engineering and technology within sustainable development.

UNIT-I

1.Anintroduction to sustainability -Introduction -The Magnitude of the Sustainability Challenge-Energy

2. Materials Use- Minerals, Metals, and Organics Water -

3.Environmental Emissions - Ozone Depletion in the Stratosphere- Global Warming-Regional and Local Air Quality -Summary ofAir Quality - Water Quality - Wastes

UNIT-II

4. Risk and life-cycle frameworksfor sustainability - Introduction- Risk -Definitions- Risk Assessment -Risk-Based Environmental Law

5.Life-Cycle Frameworks- Defining Life Cycles- Life-Cycle Assessment- Life-Cycle-Based Environmental Law ;

6. Life-Cycle Assessment Tools- Process-Based Life-Cycle Assessments Input-Output LCA - Hybrid Approaches

UNIT-III

7. Green, sustainable materials- Introduction- Environmental and Natural Resource Use Footprints of Material Extraction and Refining Tracking Material Flows in Engineered Systems

8.Introduction - Sustainable Engineering Design Principle ; Economic Performance Indicators-Definitions -Estimates of Environmental Costs- A Frameworkfor Evaluating Environmental Costs; Environmental Performance Indicators- Life-Cycle Impact Assessment

UNIT-IV

9.CASE STUDIES -Introduction ; Biofuels for Transportation-The Carbon Cycle and Biofuels-Feedstocks for Biofuels - Processing Routes for Biomass to Biofuels- Biofuel Life Cycles-Cautionary Tales and Biofuels- Summary ofSustainability ofBiofuels

10.Sustainable Built Environments- Energy Consumed for Building Operation, Materials Usefor Building Construction and Maintenance, Design of Buildings for Sustainability, Conclusions on Sustainability ofBuildings

Text Book

1. SustainableengineeringConcepts, Design, and Case Studies by DAVID T. ALLEN DAVID R. SHONNARD

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Elective - I

ADVANCED FLUID MECHANICS
III B.Tech – II Semester (Code : 18CED14)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives: The main objectives of this course are to

1. To undertake sustained learning in fluid mechanics to advance their knowledge in this field.
2. To enhance the understanding of fluid mechanics, including the equations of motion in differential form and turbulence.
3. To understand an idea about stilling basin types.
4. To understand hydraulic mechanics.

Course Outcome:

The students will be able to

1. Recognize the particular flow regime present in typical engineering system.
2. Demonstrate the concept of stream function and potential function.
3. Choose the appropriate fluid mechanics principles needed to analyze the fluid-flow situations.
4. To identify the types of stilling basins.

UNIT – I

1. **Basic Concepts and Fundamentals:** Fluid statics, Cartesian tensors, fluid kinematics, description of fluid motion, types of motion of fluid elements, vorticity and circulation, equation of motion of forced and free vortex flow.

2. **Stream function and velocity potential function:** stream function and its relation with velocity field, relation between stream lines and lines of constant potential, Lagrangian and Eulerian approaches, Reynold's transport theorem.

UNIT – II

3. **Potential flow:**Uniform flow, sink flow, source flow, plane source in a uniform flow, source and sink pair in a uniform flow, pressure distribution on the surface of cylinder. Potential flow between two parallel plates.

4. **Incompressible viscous flow:** Concept of laminar and turbulent flows, derivation of Hazen poissuille's equation for velocity and discharge through a pipe, derivation for friction factor for laminar flow, Navierstokes's equation and its significance.

UNIT – III

5. **Turbulent flow:** Introduction of turbulent flow, governing equation of turbulent flow, fully developed turbulent pipe flow for moderate Reynold's number, Prandtl's mixing length theory, turbulence modeling.

6. **Introduction to Computation of Fluid Dynamics (CFD):**Boundary conditions, basic discretization – Finite difference method, Finite volume method and Finite element method.

UNIT – IV

7. **Channel Transition:** Reduction in width of the channels, hump, surge in open channel, significance of jump, Indian type of stilling basins and USBR stilling basins.

8. **Reciprocating Pump:** Introduction, main components, slip, working producer, classification, indicator diagram, maximum speed of reciprocating pump.

Text books

1. Bansal R. K., A Text Book of Fluid Mechanics and Machines, Laxmi Publications, 2010.
2. Douglas J. F., Fluid Mechanics, Pearson Education, 2005.
3. Kumar D. S., Fluid Mechanics and Fluid Power Engineering, S. K. Kataria& Sons, 1987.
4. Muralidhar K., G. Biswas, Advanced Engineering Fluid Mechanics, Alpha Science International limited, 2005.
5. Rama D. D., Fluid Mechanics and Machines, New Age International, 2009.

Reference books

1. Schlichting H., K. Gersten , Boundary Layer Theory, 8/e, Springer 2000.
2. Shames I. H., Mechanics of Fluids, 4/e, McGraw-Hill, 2002.
3. Streeter V. L. and E. B. Wylie, Fluid Mechanics, McGraw-Hill, 1979.

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Elective - II

ADVANCED DESIGN OF STRUCTURES
III B.Tech – II Semester (Code : 18CED21)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

OBJECTIVES:

The student will study and understand:

1. Stability requirements and design of cantilever type retainingwall and design of pile foundation
2. Design of raft foundation and elevated water tank.
3. Design of Gantry Girder and its connections using LSM
4. Design of plate girder
5. Understand and design of roof truss and purlins

OUTCOMES:

Students will be able to

1. Design cantilever type retaining wall and pile foundation usingLSM.
2. Design Raft foundation and elevated water tank
3. Design of Gantry Girder efficiently and economically
4. Design of plate girder efficiently and economically
5. Determine loads on roof trusses and able to design of purlins

UNIT I

RETAINING WALLS AND PILE FOUNDATIONS

Types of Retaining walls, Forces on retaining walls, Stability requirements, Design and detailing of Cantilever type retainingwall.

Introduction to Pile foundation, Design of Pile and Pile cap.

UNIT II

DESIGN OF RAFT FOUNDATION

Introduction to Raft foundation, Design of raft Foundation.

DESIGN OF RECTANGULAR WATER TANK

Introduction, Design of Rectangular Elevated Water Tank.

UNIT III

GANTRY GIRDER

Introduction; Loads on Gantry girders; Fatigue effects; Design of gantry girder;

UNIT IV

PLATE GIRDER

Introduction, Design of flanges and web, stiffeners and their connections

UNIT V

ROOF TRUSSES

Type of trusses for different spans; Components of a roof trusses; Live loads and wind loads on trusses as per I.S Codes; Design of Purlins including tubular sections.

NOTE

Two questions of 10 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

A. For Working Stress Method: Reinforced concrete by H. J. Shah, charotarpublishinghouse
B. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros., Roorkee.
C. Limit state design of steel structures by S.K.Duggal, Tata McGrawhill,Publishing company Ltd.
D. Design of Steel structures by N.Subramanian, Oxford University press,2009

REFERENCES

1. Reinforced concrete design by Pillai and Menon, Tata McGraw-Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune VidyarthiGrihaPrakashan,Pune.
3. Design of reinforced concrete structures by S. Ramamrutham; DhanpatRai&Sons.
4. Design of Steel Structures by Limit state method as per IS800-2007 by S.S.Bhavakatti, IK International Publishing Housing Pvt.Ltd.
5. Design of Steel Structures by Limit state method as per IS800-2007 by K.LSairam, Pearson Education India
6. Structural steel design by M.L.Gambhir , Tata McGraw-Hill Education
7.

Code Books:

1. IS 456-2000, IS 3370 (Part-II and Part-IV),
2. IS 800-2007, IS 875 Part-III

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - II

OFFSHORE ENGINEERING
III B.Tech – II Semester (Code : 18CED22)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

OBJECTIVES: To enable the students to

- Learn the concepts of petroleum site exploration, analysis of offshore structure
- Understand the offshore soil mechanics.

OUTCOME:
Students will learn the basics of offshore operations. They will learn the Laboratory testing methods, In situ testing methods and geophysical methods and able to design the offshore structures.

UNIT I

Introduction to offshore oil and gas operations.Sea States and Weather, Offshore Fixed and mobile Units, Offshore Drilling, Difference in drilling from land, from fixed platform, jack up, ships and semi submersibles. Offshore Well Completion, Offshore Production systems, Deep-water technology, Divers and Safety, Offshore Environment, classification & properties of marine sediments. Consolidation and shear strength characteristics of marine sediments.Planning and site exploration.

UNIT II

Drilling.Sampling techniques.Laboratory testing, In situ testing methods and geophysical methods.Current design practices of pile supported and gravity offshore structures.

UNIT III

Dynamic analysis of offshore structures.Centrifugal modelling. Anchor design. Break out resistance analysis and geotechnical aspects of offshore pipeline and cable design. Field instrumentation and performance observation.

UNIT IV

Offshore soil mechanics; Offshore pile foundations and caissons; Design of breakwaters; Buoy design and mooring systems; Offshore drilling systems and types of platforms.

TEXT BOOKS:

- Standard Hand Book of Petroleum & Natural Gas Engineering" – 2nd Edition 2005-William C.Lyons& Gary Gulf-Gulf professional publishing comp (Elsevier).
- Wellsite Geological Techniques for petroleum Exploration by Sahay.B et al.

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Elective - II

DISASTER PREPAREDNESS AND PLANNING MANAGEMENT
III B.Tech – II Semester (Code : 18CED23)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Pre-requisite: None

COURSE OBJECTIVES: The subject provides

CO1 : Knowledge of disaster and its classifications.
CO2 : Exposure to Institutional Framework
CO3 : Good knowledge on Prevention and Mitigation
CO4 : Explanation on Preparedness and Response and Disaster Planning

COURSE LEARNING OUTCOMES: At the end of the course student will be able to

CLO1 : Know the disaster and its classifications.
CLO2 : Understand the importance of Institutional Framework
CLO3 : Gain the good exposure on Prevention and Mitigation
CLO4 : Have knowledge on Preparedness & Response and Disaster Planning

UNIT-I

Introduction; Disaster, classification of disaster- Based on Time Duration to Occur, Based on Inducing Parameters, Natural Disasters- Volcanic Eruption, Natural Disasters Induced by Human Interventions, Exclusive Human-made Disasters.

UNIT-II

Institutional Framework - Evolution of Disaster Management in India, Disaster Management during British Administration and Post Independence, Emergence of Institutional Arrangement in India, Organisation and Structure of Disaster Management, Disaster Management Framework, Present Structure for Disaster Management in India, Disaster Management Act, 2005 National Disaster Management Authority (NDMA), National Level Institutions, State level Institutions, District level Institutions, National Institute of Disaster Management (NIDM), National Disaster Response Force (NDRF), State Disaster Response Force (SDRF), Civil Defense, Fire Services, Home Guard, Interface between the Ministries for disaster Management,

UNIT-III

Prevention and Mitigation; Introduction, Mainstreaming of Disaster Risk Reduction in Developmental Strategy, National Disaster Mitigation Fund, Measures taken for Prevention and Mitigation of Hazards, Earthquakes, Cyclones, Floods, Study of Land Contour by GSI, Landslides, Tsunami, Droughts, Fire, Forest Fire Management, Oil Industry, Chemical Disasters, Prevention of Disasters in Mines, Epidemics, Measures taken for Rail Safety, Road, Civil Aviation,

UNIT-IV

Preparedness and Response; Introduction, Institutional Arrangements, India Meteorological Department (IMD), Forecast of Rainfall, Forecasting System – Background, Forecasting and Warning of Cyclones, Flood Forecasting – Central Water Commission, Tsunami warning – Indian National Centre for Oceanic Information System(INCOIS), Warning about Landslide hazard – Geological Survey of India (GSI), Avalanche warning – Defense Research & Development Organization (DRDO), Disaster Management Support (DMS) – Indian Space Research Organization, Radiological and Nuclear Emergencies, Installation of Radiological Detection Equipment, Director General of Mines Safety, Epidemic, Preparedness, Role and Responsibility of Central and State Governments, Role of the State Government, Role of District Administration, Role of Sub-district Administration, National Disaster Response Force (NDRF),

Disaster Planning; Principal causes of Disaster, Some Major Effects of Disasters, Disaster Plan.

Text Book(s)

1. K.Palanivel, J.Saravanavel, S.GunasekaranRobbins, Disaster Management, Allied Publishers Pvt. Ltd. 2015.
2. Manual on Disaster Management in India, Ministry of Home Affairs, Government of India, 2011.

References

1. Mullins, J. Laurie, Management and Organizational Behavior, Oxford Publishers, 2007.

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Elective - II

CONSTRUCTION ENGINEERING MATERIALS
III B.Tech – II Semester (Code : 18CED24)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

The student will study and understand about

1. Ferrous and non-ferrous materials.
2. Ceramic materials.
3. Polymeric materials.
4. Paints, Enamels &Varnishes and Gypsum.
5. Miscellaneous Materials and Geosynthetics, smart materials &Composite Materials

Course Outcomes:

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

1. Difference between Ferrous and non-ferrous materials which are used in construction.
2. Ceramic materials and its polymorphism, properties and classification.
3. Polymeric materialsand mechanism of polymerization and its applications.
4. Paints, Enamels &Varnishes along its composition and characteristics.
5. Gypsumand its properties.
6. Miscellaneous Materials used in construction and about Geosynthetics, smart materials &Composite Materials.

UNIT-I

1.Introduction to ferrous metals- iron- Pig Iron - Cast Iron - wrought Iron- rolled steel sections- Reinforcing steel bars- tensile testing of steel sections - alloy steel

2. Introduction to non -ferrous metals- aluminium- copper - zinc- lead- tin- nickel

UNIT-II

3. Introduction to ceramic materials - Polymorphism in ceramic materials- Mechanical, Thermal, Electrical properties of ceramic phases- Classification of ceramics- Refractories- Glass- Commercial forms of Glasses- Glass wool

4. Introduction to polymeric materials- polymerisation Mechanism- Depolymerisation- Resins - Plastics- Constituents of Plastics- Properties of Plastics- Application of plastics- rubbers- Classification of Rubbers- Uses of Rubber

UNIT-III

5. Introduction to Paints, Enamels and Varnishes- Composition of oil paints- characteristics of oil paints- preparation of paints-pigment volume concentration- water paints -enamel paints - Varnish- french polish-wax polish- defects of painted surfaces- Texture paints

6. Introduction to Gypsum- effects of heat and Moisture on Gypsum- setting and Hardening of Gypsum- Classification of Gypsum- Manufacture of Gypsum- Plaster of Paris- Gypsum wall plasters- gypsum plaster boards- pyrocell

UNIT-IV

7. Introduction to Miscellaneous Materials- Adhesives- Asbestos- Linoleum- Thermocol- Fibres- Decorative GRC materials-- Concrete Paver Blocks - Heat , Sound, Water insulating materials
8. Introduction to Geosynthetics, smart materials. Composite Materials

TEXT BOOKS

1.Building Materials by S.K. Duggal
2. Engineering Materials by R.K. Rajput

References

1. Building Materials, Construction and Planning by S.MahaboobBasha

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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ADVANCED SURVEYING LABORATORY

III B.Tech – II Semester (Code : 18CEL61)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives

- To determine distances and relative positions using trigonometric leveling
- To deal with various methods employed for the measurement of areas and volumes.
- To build the knowledge on different methods of setting & design of simple circular curves.
- To develop the concepts on usage of EDM, Digital Theodolite and total station.

Learning Outcomes

By the end of the course, the students will be able

- To determine the reduced level of different structures when base is inaccessible and accessible.
- To design and layout curves for a roads and railways.
- To prepare contour maps for the given area

To do applications related to the instuments EDM and Total station.

Experiments

1. To determine the elevation of the top of the object when the base is accessible
2. To determine the elevation of the top of the object when the base is inaccessible when the instruments are in same vertical plane.
3. To determine the elevation of the top of the object when the base is inaccessible when the instruments are in not in the same vertical plane.
4. To set Simple circular curve by using offsets from Long Chord method.
5. To set Simple circular curve by using radial, perpendicular offsets from tangents.
6. To set Simple circular curve by Rankines method or Tape and theodolite method.
7. To set Simple circular curve by Two theodolite method.
8. To Prepare Contour maps for given area by grid method using leveling Instrument.
9. To develop the knowledge on usage of Total station.
10. To perform RDM application and find the distance between inaccessible points by Total station.
11. To perform REM application to find the elevation by Total station.
12. To Calculate area for given plot by Total station.

Text books and References:

1. Surveying Vol-I by Dr K.R. Arora.
2. Surveying Vol-I by Dr B. C. Punmia.
3. Plane surveying by A M Chandra.

Note: Survey Camp is to be conducted for a minimum period of seven days Using Total Station to train in one of the following areas:

i. Preparation of a contour Plan/ Map.
ii. Earth work Computations for a high way / canal projects
iii. Marking of a Sewer line/ Water supply line.
iv. Any type of Execution works.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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STRUCTURAL ANALYSIS, DESIGN AND DETAILING LABORATORY

III B.Tech – II Semester (Code : 18CEL62)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Students are required to analyze and design the following structures using software package like STAAD/ETABS/GTSTRUDL/STRAP etc. and detailing of structures using SP34 & AUTO CAD.

1. Indeterminate beams.
2. Plane roof truss.
3. Plane frame subjected to gravity loads and lateral load (wind load).
4. SPACE(3D) frame analysis for gravity and lateral loading.
5. One-way slab.
6. Two way slab.
7. Isolated footing.
8. Pile foundation.
9. Combined footing.
10. Cantilever Retaining wall.
11. Plate girder.
12. Column base.

TEXT BOOKS

1. Limit State Design of Reinforced Concrete by P. C. Varghese, Prentice Hall of India.
2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros.,Roorkee
3. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishing house
4. Reinforced Concrete Structures by N. Subramanian, Oxford University Press.

REFERENCES

1. Reinforced concrete design by Pillai and Menon, Tata McGraw-Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune VidyarthiGrihaPrakashan, Pune.
3. Reinforced concrete design: Principles and Practice by N. Krishna Raju., R. N. Pranesh, New Age International Publishers.
4. Reinforced Concrete Structure by R. Park., T. Paulay, Wiley India Publishers

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GEO TECHNICAL ENGINEERING LABORATORY
III B.Tech – II Semester (Code : 18CEL63)

Lectures	0	Tutorial	0		Practical	3	Credits	1
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives

The objective of this course is:

CO1: To impart knowledge of determination of index properties required for classification of soils.

CO2: To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests;

CO3: To determine permeability of soils.

CO4: To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes

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

CLO1: Determine index properties of soil and classify them.

CLO2: Determine permeability of soils.

CLO3: Determine Compaction and Consolidation characteristics of soils

CLO4: Determine shear characteristics of soils

1. Determination of water content by oven drying method.
2. Determination of specific gravity by (a) Density bottle method (b) Pycnometer method.
3. Gradation analysis a) Mechanical Sieve analysis b) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by a) Core cutter method. b) Sand replacement method.
7. Determination of permeability by a)Constant head permeameter. b) Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test (Demonstration only)
14. Consolidation test.

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CONSTRUCTION MANAGEMENT
IV B.Tech – I Semester (Code : 18CE701)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES : The subject provides

CO1 : to provide a knowledge on project failures, planning and scheduling of a project.
CO2 : have knowledge on network techniques like PERT,CPM and Cost Control.
CO3 : exposure to the different types of Resources in Construction.
CO4 : will provide importance of Quality control and Safety Management.

COURSE LEARNING OUTCOMES : At the end of the course student will be able to

CLO1 : acquire knowledge on project failures an basic concepts in planning like Bar Chart and Milestone charts.
CLO2 : Prepare the network diagrams by using different techniques like PERT, CPM and can able to do cost management in the construction using cost control techniques.
CLO3 : get clear idea on different types of resources required for a project and their specifications.
CLO4 : express the importance of Quality and Safety in construction projects and good exposure to ISO standards.

UNIT – I

1. Introduction
Construction projects; Project management; Main causes of project failure.

2. Planning And Scheduling
Steps involved in planning; Objectives; Principles; Advantages; Limitations; Stages of planning; Scheduling, Preparation of construction schedules; Methods of scheduling; Bar charts; Mile stone charts; Controlling; Job layout; Factors affecting job layout; Project work break down; Activities involved; Assessing activity duration.

UNIT – II

3. Project Management Through Networks

Objectives of network techniques; Fundamentals of network analysis; Events; Activities; Dummies; Types of networks; Choice of network type; Advantages of network techniques over conventional techniques.

4. Program Evaluation And Review Technique (PERT)

Introduction; Time estimates; Earliest expected time; Latest allowable occurrence time; Slack; Critical path; Probability of completion time for a project.

5. Critical Path Method (CPM)

Introduction; Difference between CPM and PERT; Earliest event time; Latest event time; Activity time; Float; Critical activities and critical path.

6. Cost Control

Direct cost; Indirect cost; Total project cost; Optimization of cost through networks; Steps involved in optimization of cost.

UNIT – III

7. Resource Management (Manpower)

Introduction; Resource smoothing; Resource levelling; Establishingworkers productivity.

8. Resource Management (Materials)

Objectives of material management; Costs; Functions of material management department; ABC classification of materials; Inventory of materials; Material procurement; Stores management.

9. Resource Management (Machinery)

Classification of construction equipment; Earth moving equipment; Excavation equipment; Hauling equipment, Earth compaction equipment; Hoisting equipment; Concreting plant and equipment; Time and motion study; Selection of equipment– Task consideration, Cost consideration; Factors affecting the selection; Factors affecting cost owning and operating the equipment; Equipment maintenance.

UNIT – IV

10. Quality Control

Importance of quality; Elements of quality; Organization for quality control; Quality assurance techniques; Documentation; Quality control circles; Total quality management; ISO – 9000.

11. Safety Management

Accident prevention programme; immediate attention in case of accident; Approaches to improve safety in construction; Safety benefits to employers, employees and customers; Prevention of fires in construction industries; Fault free analysis; Safety information system; Safety budgeting.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Construction Engineering and Management by Dr. S. Seetharaman; Umesh Publications, Nai Sarark, Delhi.
2. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers, NaiSarak; Delhi.

REFERENCE BOOKS

1. Construction Management & Planning by B. Sengupta& H. Guha; Tata McGraw – Hill Publishing Co. Ltd., New Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L.; McGraw – Hill International Book Company.
3. PERT & CPM Principles and applications by L. S. Srinath; Affiliated East West Press.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

Elective - III

PRE STRESSED CONCRETE
III B.Tech – II Semester (Code : 18CED31)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives

1. To highlight the concepts of pre-stressing in concrete and materials used for pre-stressing.

2. To analyze the general mechanical behavior of pre-stressed concrete members on comparison with those of RCC members.

3. To understand various losses of pre-stress and estimate the deflection in pre-stressed concrete members.

4. To design pre-stressed concrete beams.

5. To analyze and design of end anchorages for pre-stressed concrete members.

Learning Outcomes:

1. Understand the concepts of pre-stressing in concrete and state the necessity for high strength steel and concrete in PSC and explanation of the various types of pre-stressing systems.

2.Understand the difference in the analysis of general mechanical behavior of PSC and RCC members.

3.Evaluate the total losses allowed for design of PSC members and estimating the deflection in PSC members.

4.Design pre-stressed concrete beams using IS1343.

5.Analyzing and designing the end anchorages for pre-stressed concrete members.

UNIT – I

1. Introduction Basic concepts of prestressing; Need for High strength steel and High strength concrete; Advantages of prestressed concrete.
2. Materials For Prestressed Concrete High strength concrete; High tensile steel.
3. Prestressing Systems Tensioning devices; Hoyer's long line system of pretensioning; Post tensioning systems; Detailed study of Freyssinet system , Lee-McCall System and Gifford – Udall system;
4. Analysis Of Prestress And Bending Stresses Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment.

UNIT – II

5. Losses of Prestress Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.
6. Deflections of Prestressed Concrete Members Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members

UNIT – III

7. Elastic Design Of Prestressed Concrete Sections For Flexure Permissible compressive stresses in concrete as per IS 1343; Design of rectangular and I – sections of TYPE 1, TYPE 2 (Elastic Design only).

UNIT – IV

8. Shear Resistance Shear and Principal Stresses; Ultimate shear resistance of prestressedconcrete members; Design of shear reinforcement.
9. Transfer Of Prestress In Pre–Tensioned Members & Flexural Bond Stresses Transmission of prestressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre –tensioned and post – tensioned grouted beams.
10. Anchorage Zone Stresses In Post-Tensioned Members Stress distribution in end block; Anchorage zone reinforcements; Design of anchorage and end block as per IS 13-43.

TEXT BOOKS:
Prestressed Concrete by N. Krishna Raju; Tata McGraw - Hill Publishing Company Limited, NewDelhi.

REFERENCE BOOKS
1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons.
2. Prestressed Concrete by P.Dayaratnam. Oxford & IBH
3. Prestressed Concrete by N.RajaGopalan. PH

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

Elective - III

ENVIRONMENTAL GEOTECHNICS
III B.Tech – II Semester (Code : 18CED32)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. To introduce soil structure and clay minerals.
2. To know characteristics and classification of wastes
3. Introducing hydrology of contaminants.
4. Introducing methods of disposal and site remediation

Course Outcomes:

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

1. Understand soil structure and clay minerals
2. Understand characteristics and classification of wastes
3. Understand characteristics and classification of wastes
4. Understand methods of disposal and site remediation

UNIT-I

CLAY MINERALOGY AND SOIL STRUCTURE

Clay mineralogy and soil structure: Gravitational and surface forces-inter sheet and inter layer bonding in the clay minerals- Basic structural units of clay minerals- isomorphous substitution – kaolinite mineral- montmorillonite mineral- illite mineral- electric charges on clay minerals – base exchange capacity- diffused double layer- adsorbed water- soil structure- methods for the identification of minerals (introduction only).

UNIT-II

CHARACTERISTICS AND CLASSIFICATION OF WASTES

Wastes and Contaminants (introduction only): sources of wastes-types of wastes-composition of different wastes- characteristics and classification of hazardous wastes- generation rates- Soil water environment interaction relating to geotechnical problems-Effect of pollution on soil water behaviour-Case studies of foundation failures by ground contamination.

UNIT-III

HYDROLOGY OF CONTAMINANTS

Transport phenomena in saturated and partially saturated porous media-contaminant migration and contaminant hydrology- Ground water-pollution downstream for landfills due to Leachate migration-Passive containment systems – Containment control systems- liners and covers for waste disposal- rigid liners- flexible liners.

UNIT-IV

METHODS OF DISPOSAL AND SITE REMEADIATION

Criteria for selection of sites for waste disposal – Surface and subsurface waste disposal techniques-Ground modification techniques in waste management – Physical modification-Thermal modification-chemical modification-Bioremediation-Geotechnical properties of wastes-Bearing capacity of landfill sites-foundation for waste fill ground.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1.Mitchell, J (1976), " Fundamentals of soil behaviour", John Wiley and sons, New York

2. Daniel,B.E., " Geotechnical Practice for Waste disposal ", Chapman and Hall, London, 1993.

3. Iqbal,H.Khan "Text book of Geotechnical Engineering" Second Edition

REFERENCES

1. Lambe, T. W & Whitman, R. V (1979), " Soil Mechanics ", John Wiley and Sons, New York.

2. GopalRanjan& A.S.R Rao (1991), " Basic and Applied Soil Mechanics, Wiley Eastern Ltd., New Delhi.

3. Wilson, M. J (1987), " A Hand book of Determinative methods in Clay Mineralogy", Chapman and Hall, New York.

4. Robert M. Koerner (1984), "Construction and Geotechnical methods in Foundation Engineering", McGraw Hill Book Co., New York.

5. Yong R. N. (1992), " Principles of contaminant Transport in Soils, "Elsevier, New York. RamanathaIyer T. S (2000), "Soil Engineering Related to Environment", LBS centre.

6.Lagrega, M.D., Buckingham, P.L. and Evans, J.B., " Hazardous Waste Management McGraw Hill, Inc., Singapore, 1994.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

Elective - III

LOW COST HOUSING TECHNIQUES
III B.Tech – II Semester (Code : 18CED33)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. To examine the present housing scenario in India.
2. To introduce the economic issues related to housing especially in developing countries like India.
3. To know Building by-laws for housing and housing for urban poor.
4. Introducing low cost housing techniques
5. Introducing building materials for low cost housing
6. Introducing traditional practices for low cost housing
7. To give an introduction on design concepts of seismic resistant structures and to understand earth quake resistant design.

Course Outcomes:

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

1. Understand Housing Scenario and Housing Finance
2. Apply Building by-laws for urban planning and Housing for Poor
3. Apply Low Cost Housing Techniques
4. Use Building Materials for low cost Housing
5. Apply concepts of Traditional practices of Rural Housing Technology and design concepts of seismic resistant structures.

UNIT-I

1. Housing Scenario Introducing- Status of urban housing- Status of Rural Housing-

2. Housing Finance: Introducing- Existing finance system in India- Government role as facilitator- Status at Rural Housing Finance- Impedimental in housing finance and related issues

UNIT-II

3. Land use and physical planning for housing: Introduction- Planning of urban land- Urban land ceiling and regulation act- Effectincey of building bye laws- Residential Densities

4. Housing the urban poor: Introduction- Living conditions in slums- Approaches and strategies for housing urban poor

UNIT-III

5. Development and adopt on of low cost housing technology: Introduction- Adoption of innovative cost effective construction techniques- Adoption of precast elements in partial prefabrication- Adopting of total prefabrication of mass housing in India- General remarks on pre-cast rooting/flooring systems- Economical wall system- Single Brick thick loading bearing wall- 19cm thick load bearing masonry walls- Half brick thick load bearing wall- Flyashgrypsym thick for masonry- Stone Block masonry- Adoption of precast R.C. plank and join system for roof/floor in the building.

UNIT-IV

6. Alternative building materials for low cost housing: Introduction- Substitute for scarce materials- Ferro cement- Gypsum boards- Timber substitutions- Industrial wastes- Agricultural wastes

7. Low cost Infrastructure services: Introducing- Present status- Technological options- Low cost sanitation's- Domestic wall- Water supply- energy

UNIT-V

8. Rural Housing: Introduction- traditional practice of rural housing continuous - Mud Housing technology- Mud roofs- Characteristics of mud- Fire resistant treatment for Thatched roof- Soil stabilization- Rural Housing programs

9. Housing in Disaster Prone areas: Introduction- Earthquake- Damages to houses- Traditional Houses in disaster prone areas Type of Damages and Railways of non-engineered buildings- Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions - Requirement's of structural safety of thin precast roofing units against - Earthquake forces- Status of R& D in earthquake strengthening measures- Floods- cyclone- future safety

TEXT / REFERENCE BOOKS:

1. Building materials for low –income houses – International council for building research studies and documentation's.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of Concrete – Neville A.M. Pitman publishing Limited- London.
4. Light weight concrete- Academic kiado- Rudhai .G – Publishing home of Hungarian Academy of Sciences 1963.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

Elective – III

REPAIR & REHABILITATION OF STRUCTURES
IV B.Tech – I Semester (Code : 18CED34)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives

1. To learn various distress and damages to concrete and masonry structures and to understand the importance of maintenance of structures
2. To apply Non Destructive Testing techniques to field problems and to learn the importance of methods of substrate preparation
3. To study the various types and properties of repair materials
4. To apply cost effective retrofitting strategies for repairs in buildings.

Learning Outcomes

1. Understand the need for rehabilitation of structures and their maintenance and evaluation of the damages in R C Buildings and masonry structures.
2. Equip student with concepts of NDT and evaluation and to understand the importance of methods of substrate preparation.
3. Knowing the various types of repair materials available and to understand their behavior and properties of repair materials.
4. Knowing various methods of crack repair and application of the cost effective retrofitting strategies for repairs in buildings.

UNIT-I

Introduction Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures. Cracks in R.C. buildings Various cracks in R.C. buildings, causes and effects Maintenance importance of maintenance, routine and preventive maintenance. Damages to masonry structures Various damages to masonry structures and causes

UNIT-II

Damage diagnosis and assessment Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test,Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement Substrate preparation Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning

UNIT-III

Repair materials Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials Special mortars and concretes Polymer Concrete and Mortar, Quick setting compounds Grouting materials Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and Urethane grouts. Bonding agents Latex emulsions, Epoxy bonding agents. Protective coatings Protective coatings for Concrete and Steel FRP sheets

UNIT-IV

Crack repair Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks. Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing. Strengthening , Beam shear strengthening, Flexural strengthening

TEXT BOOKS

1. “Repair and protection of concrete structures” by Noel P.Mailvaganam, CRC press London.

2. “Concrete repair and maintenance Illustrated” by Peter.H.Emmons, Galgotia publishers.

3. “Earthquake resistant design of structures” by Pankajagarwal, Manish shrikande, PHI.

REFERANCES

1. “Failures and repair of concrete structures” by S.Champion, John wiley and sons.

2. “Diagnosis and treatment of structures in distress” by R.N.Raikar Published by R & D centre of structural designers and consultants pvt.ltd, Mumbai.

3. “Handbook on repair and rehabilitation of RCC buildings”, CPWD, Government of India.

4. “Handbook on seismic retrofit of buildings”, CPWD, Indian buildings congress, IIT Madras, Narosa Publishing House.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - IV

ADVANCED ENVIRONMENTAL ENGINEERING
IV B.Tech – I Semester (Code : 18CED41)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives

1. Describe about the concept of sewage disposal in streams.
2. Learn about the available low cost treatment methods.
3. Design construction, operation and maintenance of industrial treatment plants.
4. Explain about the sources, characteristics and control of Air Pollution and Noise Pollution.

Learning Outcomes

1. acquaint the knowledge of protection of water bodies against Contamination on disposal of wastewater.
2. acquaint new concepts of waste water treatment & design of low cost treatment units.
3. Plan suitable treatment process for selected industrial effluents.
4. Acquaint types of air pollutants, their effects and controlling devices to control particulate matter and develops an ability to understand basics of noise sources, effects and Controlling measures

UNIT – I

1. Sludge Treatment And Disposal

Characteristics of sewage sludge; Anaerobic sludge digestion process; Stages of sludge digestion; Factors affecting sludge digestion; Sludge digestion tank; High rate digestion; Sludge thickening; Sludge conditioning; Methods of dewatering the sludge; Methods of sludge disposal.

2. StreamSanitation

Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification;

UNIT – II

3. Low Cost Wastewater TreatmentSystems

Introduction; Stabilization ponds (including design aspects); Aerated lagoons; Oxidation ditch; Extended aeration process.

4. New Concepts In Biological WasteTreatment

Introduction; Nitrogen removal by biological nitrification and de-nitrification; Rotating Disc Biological Contactor; U-Tube aeration systems.

UNIT – III

5. Industrial WastewaterTreatment

Characteristics of industrial wastewater, Introduction to Industrial Wastewater treatments.

Sugar Plant: Sources and characteristics of liquid waste; Methods of its treatment and disposal.

Dairy Industry: Sources and characteristics of liquid waste; Methods of its treatment and disposal.

PulpandPaperIndustry:Sources andcharacteristics ofliquidwaste;Methodsofits treatment anddisposal.

UNIT – IV

6. Sources And Effects Of AirPollution

Natural and Anthropogenic sources; Stationary and mobile sources; Primary and secondary pollutants;Particulatematter;Gaseouspollutants;Effectsofairpollutantsonhumanhealth; Effectson plants; Economicaleffects.

7. Meteorology And AirPollution

Atmospheric stability and temperature inversions; Design of Stack Height based on Board formulas; Plume rise models; Plume behavior; Gaussian Dispersion Model;

8. Control of AirPollution

Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Wastewater Treatment by M.N. Raoand A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. WastewaterEngineering,Treatment,DisposalandReusebyMetcalf&EddyInc.;TataMcGraw– Hill Publishing Co. Ltd., New Delhi.
3. AirPollutionbyM.N. RaoandH.V.N.Rao;TataMcGraw– HillPublishingCo.Ltd.,NewDelhi.

REFERENCES

1. EnvironmentalPollutionControlEngineeringbyC.S.Rao;WileyEasternLtd.,NewDelhi.
2. Water Supply and Wastewater Disposal by G.M. Fair et all; John Wiley &Sons.
3. SewageDisposalandAirPollutionEngineeringbyS.K.Garg;Khanna Publications,Delhi.
4. Sewage and Sewage Treatment by S.K. Kshirasagar; RoorkeePublishing House,Roorkee.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

Elective - IV

BRIDGE ENGINEERING
IV B.Tech – I Semester (Code : 18CED42)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

(Working stress method is to be adopted for all designs)

COURSE OBJECTIVES

- The main aim of this course is to enable students to choose the appropriate bridge type for a given project and to analyses and design the main components of the chosen bridge.
- Discuss the IRC standard live loads and design the deck slab type bridges.
- Design of T-Beam bridges using various methods.
- Design of sub structure parts of the bridge.
- Design of various bridge foundations and discuss the different types of bridge bearings.

LEARNING OUTCOMES

1) To develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
2) The students are expected to be able to understand the load-carrying capacity of various types of bridges, upon learning the structural responses to different kinds of loads.
3) Students able design bridge economically by learning all the methods.
4) Able to decide which type of abutment walls and shape of piers used under various weather conditions.
5) Know the importance of bearings and helps to use latest bearings in construction technology.

UNIT – 1

1. Introduction & Investigation for Bridges

Components of a Bridge; Classification; Need for Investigation; Selection of Bridge Site; Preliminary Data to be Collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Traffic Projection; Choice of Bridge type; Importance of Proper Investigation.

UNIT – II

2. Standard specification for road bridges

IRC Bridge code: width of carriageway: clearances: loads to be considered – dead load: IRC standard live loads: impact effect.

3. Design of Culverts

Design of Reinforced concrete slab culvert.

UNIT – III

4. Design of T – Beam Bridge

Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T – beam bridge.

UNIT – IV

5. Sub Structure for Bridges

Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment.

UNIT – V

6. Foundations for Bridges

Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

7. Bearings for Bridges

Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

NOTE

Two questions of 12 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1. Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Design of Bridge Engineering by T.R Jagadeesh, M.A Jayaram, PHI Learning Pvt. Ltd, New Delhi
3. Bridge Engineering by Rangwala, Charotar Publishing House Pvt. Ltd.,

REFERENCE BOOKS

1. Design of Bridges by N. Krishna Raju, Publisher: Oxford & IBH Publishing Co Pvt. Ltd.
2. Bridge Engineering by S. Punnuswamy, (Third Edition 2017) Mcgrawhill Education Pvt. Ltd.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
(Autonomous)

Elective - IV

WATER RESOURCES FIELD METHODS
IV B.Tech – I Semester (Code : 18CED43)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

CO1: Identify soil conservation methods and create a plan to conserve soil in real-life situations

CO2: To provide a comprehensive discourse on the engineering practices of watershed management for realizing the higher benefits of watershed management.

CO3: An ability to use the techniques, skills, and modern modeling software tools necessary for water resource planning and management.

CO4: To identify appropriate measures for mitigating the potential impacts of the proposal

Course Outcomes: Students will be able to

CLO-1: Students will broadly explore soil erosion to understand the physical mechanisms behind the process of erosion and the impacts that sediment has on water quality.

CLO-2: The students will be able to apply the knowledge of overall concepts of watershed which would help to comprehend and analyze for better management.

CLO-3: They will be able to develop the Rainfall Runoff problems using computer software like ANN and Fuzzy.

CLO-4: Facilitate informed decision making, including setting the environmental terms and conditions for implementing the proposal.

UNIT – I

1.Operation, Maintenance and Management of Water Resource Project

Regulation of reservoirs; diversion works and canals; monitoring behavior of structures; works regulated for maintenance and management; causes of failure of hydraulic structures and their remedial measures.

UNIT – II

2. Impact Assessment of Water Resources Development Projects

Ecosystem, impact assessment methodologies, impact assessment of water resources projects – case

studies, equilibrium analysis and sustainable development, policy and legislation.

UNIT – III

3. Water Quality Assessment of Management

Water movement and mixing process, nutrient cycle and budget, trophic dynamics and biological productivity, water supply and quality for dynamics and management, impact of pollution and toxicsubstances.

UNIT – IV

4. GIS in Water Resource Planning and Management

Introduction of GIS; Creation of digital geographical data; characteristics of GIS; utilization of GIS forwater resources; application for hydrologic modeling.

Practicals - Surface water body mapping, Delineation of watershed, DEM generation: slope, Aspect,flow direction, Flow accumulation, Drainage, network & morphometric analysis.

Practicals - Surface water body mapping, Delineation of watershed, DEM generation: slope, Aspect,flow direction, Flow accumulation, Drainage, network & morphometric analysis.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - IV

GROUND IMPROVEMENT TECHNIQUES
IV B.Tech – I Semester (Code : 18CED44)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES:

CO1: To enable the students to acquire the knowledge of ground improvement techniques and their modification, suitability, feasibility and desirability
CO2: To enable the students to understand various methods of in-situ densification in granular soils
CO3: To enable the students to understand various methods of in-situ densification in cohesive soils
CO4: To impart the students knowledge of principles of reinforced earth and design of reinforced earth walls
CO5: To impart the students knowledge of geotextiles and their functions , applications and tests
CO6: To enable the students to understand various methods of mechanical stabilization
CO7: To enable the students to understand various methods of cement stabilization
CO8: To enable the students to understand various methods of lime and bitumen stabilization

COURSE OUTCOMES:

The student should be able to know:

CLO1: Various ground improvement techniques and their modifications, suitability, feasibility and desirability
CLO2: Various methods in-situ densification of granular soils
CLO3: Various methods in-situ densification of cohesive soils
CLO4: The design of reinforced earth walls
CLO5: The functions and applications of geotextiles
CLO6: Various methods of mechanical stabilisation
CLO7: Various methods of cement stabilisation
CLO8: Various methods of lime and bitumen stabilisation

UNIT-I

1. **Introduction**

Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

2. **In-situ densification methods in granular soils**
Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth.

UNIT-II

3. **In-situ densification methods in cohesive soils**
Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.
4. **Reinforced earth**
Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT-III

5. Geotextiles
Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.
6. **Mechanical Stabilization**
Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control.

UNIT-IV

7. Cement Stabilization
Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.
8. Lime and Bituminous Stabilization
Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods.
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NOTE
Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.
TEXT BOOK
1. HausmannM.R(1990) Engineering Principles of ground modification, McGraw-Hill International edition.
REFERENCES
1. Ground improvement Techniques, P.PurushothamaRaju, Laxmi Publications Pvt. Ltd., New Delhi.
2. Robert M. Koerner, Designing with Geosynthatics, Prentice Hall New Jercy, USA.
3. Construction and Geotechnical methods in Foundation Engineering, R.M.Koerner, McGraw-Hill Book Company.
4. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, New Delhi.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Institution Elective - I

AIR POLLUTION & CONTROL
IV B.Tech – I Semester (Code : 18CE101)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES:

1. To take up the basic concepts of sources and effects of Air Pollution
2. The contents involved the knowledge of the effect of metrological parameters on air pollution
3. The contents involved the knowledge of the control of air pollution from particulates
4. To develop skills relevant to control of gaseous pollution and also introduce about Air Quality Management

COURSE OUTCOMES: On the completion of the course one should be able to understand:

1. The concepts of sources of air pollution and effects of air pollutants on man, materials and plants
2. Be able to understand the effect of air pollution with meteorological parameters
3. The knowledge about particulate control by different devices
4. Be able to develop gaseous pollution control technologies and estimate the quality monitoring of air pollutants

UNIT –I

Air Pollution –Definitions, Air Pollutants–Classifications –Natural and Artificial– Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution-stationary and mobile sources.

Effects of Air pollutants on man, material land vegetation: Global effects of air pollution – Green House effect ,Heat Islands, Acid Rains, Ozone Holes etc.

UNIT –II

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomenon Air Quality-wind rose diagrams.

UNIT – III

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Theory and problem related to Gaussian dispersion model.

Control of particulates –Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's–Settling Chambers, Centrifugal separators, filters Dry and Wetscrubbers, Electrostatic precipitators.

UNIT – IV

General Methods of Control of NOx and Sox emissions–In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management–Monitoring of SPM, SO;NO and CO Emission Standards.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXTBOOKS:

1.AirpollutionByM.N.RaoandH.V.N.Rao –Tata Mc.GrawHillCompany.
2.AirpollutionbyWarkand Warner.-Harper&Row,NewYork.

REFERENCE BOOK:

1.An introduction to Air pollution by R.K.Trivedy and P.K.Goel,B.S.Publications

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Institution Elective - I

RURAL WATER SUPPLY AND ENVIRONMENT SANITATION

IV B.Tech – I Semester (Code : 18CE102)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Objective:

1. Apply knowledge of basic sciences and engineering to analyze water resources systems for socio-economic development.
2. Identify the sources of water and their characteristics.
3. Identify and select criteria for the selection of sanitation technology
4. To learn about analytical & design methods for environmental systems.

Course Outcomes: At the end of the course the student will be able to:
1.Identify problems pertaining to rural water supply and sanitation.
2.Design water supply and sanitation system for rural community.
3.Design low cost waste management systems for rural areas.
4.Plan and design an effluent disposal mechanism.

UNIT - I

WATER SUPPLY: Issues of rural water supply –Various techniques for rural water supply-merits- National rural drinking water program- rural water quality monitoring and surveillance-operation and maintenance of rural water supplies

UNIT - II

LOW COST WATER TREATMENT: Introduction – Epidemiological aspects of water quality methods for low cost water treatment - Specific contaminant removal systems

UNIT - III

RURAL SANITATION: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas stabilization ponds - septic tanks - Imhoff tank- soak pits- low cost excreta disposal systems Effluent disposal.

UNIT - IV

4. INDUSTRIAL HYGIENE AND SANITATION: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and

comfort- Industrial plant sanitation. SOLID WASTE MANAGEMENT: Disposal of Solid Wastes- Composting- land filling incineration- Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

Text Books:

1. Eulers, V.M., and Steel, E.W., Municipal and Rural Sanitation, 6 th Ed., McGraw Hill Book Company, 1965.
2. 2. Park, J.E., and Park, K., Text Book of Preventive and Social Medicine, BanarsidasBhanot, 1972

Reference Books

1. Wright, F.B., Rural Water Supply and Sanitation, E. Robert Krieger Publishing Company, Huntington, New York, 1977.
2. Juuti, P., Tapio S. K., and Vuorinen H., Environmental History of Water: Global Views

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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PROFECT - I
IV B.Tech – I Semester (Code : 18CEP01)

Lectures	0	Tutorial	0		Practical	3	Credits	1
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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DESIGN AND DETAILING OF IRRIGATION STRUCTURES LABORATORY
IV B.Tech – I Semester (Code : 18CEL71)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives

- To explain design of various Irrigation Structures
- To describe detailing of various Irrigation Structures
- To explain detailing of various Irrigation Structures using AutoCAD software
- To demonstrate developing a spreadsheet using MS-EXCEL software of various Irrigation structures

Learning Outcomes

Student will be able to

- To design various Irrigation structures
- To detail various Irrigation structures
- To detail various Irrigation structures using AutoCAD software
- To develop a spreadsheet using MS-EXCEL software of various Irrigation structures

Students are required to design the following Irrigation structures using Excel Spread sheets software and detailing using software packages like Auto CAD/Micro station etc.,
Note: A minimum of FOUR (4 No) shall be done and recorded

1. Irrigation canal.
2. Canal drop – Notch type.
3. Canal regulator.
4. Vertical drop weir on permeable foundations.
5. Syphon Aqueduct (Type – III Aqueduct).
6. Profile of a Ogee spillway.

TEXT BOOKS

1. Design of Minor Irrigation and Canal Structures by C. Satyanarayana Murthy; Wiley Eastern Ltd., New Delhi.
2. Irrigation and Water Power Engineering by Dr. B.C.Punmia&Dr.Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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TRANSPORTATION ENGINEERING LABORATORY
IV B.Tech – I Semester (Code : 18CEL72)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Note: 1. A minimum of twelve (12No) shall be done and recorded
2. Demonstration will be given to the remaining experiments

Prerequisites: Geotechnical Engineering Lab (18CEL63)

Course Objectives:
CO1: To assess the physical properties of aggregates and bitumen for road construction.
CO2: To assess the properties of bituminous mix.
CO3: To evaluate the sub-grade soil properties.
CO4: To measure the unevenness of the pavement surface.

Course Outcomes: Student will be able to
CLO1: Evaluate the physical properties of aggregate and bitumen for road construction
CLO2: To design the Job mix formula for Bituminous mixes
CLO3: To examine the feasibility of soil as a suitable material in road construction.
CLO4: Evaluate the roughness of pavement surface.

A. Tests on Aggregates
1. Aggregate Crushing value test.
2. Aggregate impact value test.
3. Los Angele's abrasion test.
4. Deval's attrition value test.
5. Shape test a) Flakiness index test b) Elongation index test c) Angularity number test. .
6. Specific gravity Test.

B. Tests on Bituminous Materials
7. Penetration test.
8. Softening point test.
9. Flash and fire point test.
10. Ductility test.
11. Viscosity test.
12. Bitumen Extractions Test.
13. Specific gravity of Bitumen.

C. Test on Bituminous Mixes
14. Marshall stability test.

D. Test on Soil Sub grade

15. California bearing ratio test.
16. Dynamic cone penetrometer test

E. Pavement Evaluation

17. Roughness of pavement by using MERLIN

Text/Reference Books:

1. S.K. Khanna, C. E. G. Justo, A.Veeraragavan" Mannual on Highway Materials and Pavement Testing" Nem Chand Bros, Roorkee (2013). Revised 5th Edition.
2. Laboratory Manual in Highway Engineering by Ajay K. Duggal and Vijay P. Puri - New age Publishers.
3. Bureau of Indian standards, Indian standard methods of test for soils, Part-16, Laboratory determination of CBR, IS:2720 (part-16)-1987 Reaffirmed 1997.
4. Bureau of Indian standards, Indian standard methods of test for aggregate for concrete, mechanical properties, IS:2386-1963 (Reaffirmed 1997).
5. Bureau of Indian standards, Indian standard specification of coarse and fine aggregate from Natural sources for concrete, IS:383-1970 (Reaffirmed 1997).
6. Bureau of Indian standards, IS: 1201-1220(1978), Indian standard methods for testingTar and Bituminous materials.
7. Bureau of Indian standards IS: 73-2013, Indian standard Paving Bitumen -Specification.
8. Ministry of Road Transport and Highways- Specifications for Roads and Bridge Works, Fifth Revision, IRC, New Delhi, India-2013

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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QUANTITY ESTIMATION & PROJECT MANAGEMENT
IV B.Tech – I Semester (Code : 18CEL73)

Lectures	0	Tutorial	0	Practical	3	Credits	1
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES :
CO1 : To estimate the quantities of various items of a Residential Buildings.
CO2 : To evaluate the Quantity of steel for Building elements
CO3 : To determine the project duration and finding the critical path of the projects.

COURSE LEARNING OUTCOMES : At the end of the course student will be able to
CLO1 : To calculate the quantities of Residential Building with different methods.
CLO2 : To determine the Steel quantity with bar bending details in RCC members.
CLO3: To calculate the project completion time and prepare the project network by using different techniques.

UNIT – I

1.Quantity estimation of a single storey residential building (different items).
2. Cost estimation of a single storey residential building.
3. Quantity estimation of a B.T.Road(different items).
4. Cost estimation of a B.T.Road.
5. Quantity estimation of a Canal (different items).
6. Cost estimation of a Canal.
7. Find out the labour requirement and preparing the Rate Analysis for different items of work. a) C.C b) R.C.C c) Brick work d) Flooring

UNIT- II

8.Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stone chart.
9. Preparing the Project management report for a single storey residential building by using the network technique (PERT/CPM).
10. Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).
11. Preparing the Project management report for a Canal by using the network technique (PERT/CPM).

UNIT- III

12. Quantity estimation of RCC roof slab and preparing schedule of bars
13. Quantity estimation of RCC beam and preparing schedule of bars
14. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars.
15. Quantity estimation of RCC retaining wall and preparing schedule of bars

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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ENGINEERING ECONOMICS & MANAGEMENT
IV B.Tech – II Semester (Code : 18CE801)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

UNIT-I

Introduction: Economics-flow in an Economy, Law of Supply and Demand, Concepts of Engineering Economics- types of Efficiency, Definition and Scope of Engineering Economics, Elements of Cost, Other Costs/ Revenues – Marginal Cost, Marginal Cost, Marginal Revenue, Sunk Cost, Opportunity Cost, Break – Even Analysis, Profit/ Volume Ratio.

Elementary Economic Analysis; Introduction, Examples for Simple Economic Analysis – Material selection for a product, Design selection for a product, Design selection for a process industry, building material selection for construction activities Process planning/ process modification.

UNIT-II

The Organisational Setting: the nature of organizational behavior- the meaning of organizational behavior, the study of organizational behavior, a frame work of study, influences on behavior, multidisciplinary approach, organizational metaphors, orientations to work and the work ethic, management as an integrating activity, the psychological contract, the peter principle, Parkinson's Law, the changing world of work organisations, globalization and the international context, a cross cultural approach to management, Organisational behavior culture-bound, five dimensions of culture, emerging frameworks for understanding culture, convergence or culture-specific organsational behavior, the importance of organisation behavior.

UNIT-III

Approaches To Organisation andManagement: theory of Management, Developments in management and organizational behavior, the classical approach, scientific management, relevance of scientific management, bureaucracy – main characteristics, Criticisms, Evaluation, , human relations - approach, evaluation, Neo-human relations. The systems approach, decision making approach, social action, relevance to management and organizational behavior.

UNIT-IV

The Nature and Context of Organisations; Perspectives of the organistion, formal organsation, basic components of an organization, private and public sector organisations, social enterprise organization, production and service organisations, types of authority and organisations, classification of organisations, comparative study of organisations, organizational conflict contrasting views of conflict, positive and negative outcomes of conflict, sources of conflict. Strategies for managing conflict, organizational stress, causes of stress, coping with stress, the work /life balance, the organization of the future.

Text Book(s)

1. R. Panneerselvan, engineering economics, PHI Learning Private Limited2012
2. Laurie J. Mullins, Management and Organizational Behavior, Pearson Education Limited, 2010.

References

1. Robbins, Stephen, S. Sanghi, Organizational Behavior, Pearson Education. 2010.

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Institution Elective - II

DISASTER MANAGEMENT
IV B.Tech – II Semester (Code : 18CE103)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES : The subject provides
CO1 : Clear knowledge of Disaster, Hazards and Vulnerabilities.
CO2 : knowledge of Mechanism of Disaster Management.
CO3 : clear idea of Capacity Building.
CO4 : explains how to do the planning for disaster management.

COURSE LEARNING OUTCOMES : At the end of the course student will be able to
CLO1 : understands Disaster, Man-made Hazards and Vulnerabilities.
CLO2 : understands Disaster Management Mechanism
CLO3 :understands Capacity Building Concepts
CLO4 : understands Planning of Disaster Managements

UNIT-I

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)
Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards.

UNIT-II

Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigationand Preparedness - Planning for Relief.

UNIT-III

Capacity Building: Capacity Building: Concept - Structural and Nonstructural MeasuresCapacity Assessment; Strengthening Capacity for Reducing Risk - Counter-DisasterResources and their utility in Disaster Management - Legislative Support at the state andnational levels

UNIT-IV

Coping with Disaster: Coping Strategies; alternative adjustment processes – ChangingConcepts of disaster management - Industrial Safety Plan; Safety norms and survival kits -Mass media and disaster management.

Planning for disaster management: Strategies for disaster management planning - Steps forformulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and districtdisaster management plans.

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govt ofIndia.
2. Disaster Management by MrinaliniPandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education(India) Pvt Ltd Wiley 2015.

REFERENCES:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BSPublications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India(http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

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Institution Elective - II

REMOTE SENSING &GIS
IV B.Tech – II Semester (Code : 18CE104)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES:

- Learn basic concepts of Aerial Photographs.
- Learn basic concepts of remote sensing and its characteristics, satellite sensors andplatforms.
- Know about satellite digital image processing and classification techniques.
- Understand the basic concepts GIS, spatial data and analysis.
- applications of GPS in surveying.
- Know various remote sensing and GIS applications in civil engineering.

COURSE OUTCOMES:

- Interpret Information from Aerial Photographs.
- Exposure on Basics of Remote Sensing, Satellite Sensors and Platforms, Practical Knowledge on Satellite Image Classification.
- Know Basics of GIS And Map Making. Exposure About Spatial Analysis Using Overlay Tools.
- Geo-Tag Assets Using GPS And Add Attribute & Meta-Data.
- Get the Knowledge on Various Remote Sensing and GIS Applications in Civil Engineering.

UNIT- I

PHOTOGRAMMETRY:

Fundamentals of Photogrammetry and Photo interpretation – types of photographs;Vertical photographs – principal point; scale; Stereoscopy; Overlap, side lap and flight planning.

UNIT – II

REMOTE SENSING:

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere and target –

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, Space-borne remote sensing. Visual Interpretation Techniques.

Overview of Indian Remote sensing satellites and sensors, satellite definition and types, characteristics of satellite, characteristics of satellite orbit

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Introduction, key components, data entry &preparation – Spatial data input, Raster Data Model, Vector Data Model, Raster Vs Vector.advantages and dis advantages of Raster & Vectornetwork analysis - concept and types, Data storage-vector data storage, attribute data storage.

UNIT - IV

GLOBAL POSITIONING SYSTEM (GPS)&RS AND GISAPPLICATIONS:

GPS definition, components of GPS, GPS receivers.Space, Control and User segments of GPS.Advantages and disadvantages of GPS, Limitations and applications of GPS Indian Systems (IRNSS, GAGAN)Development of GPS surveying techniques, Navigation with GPS, Applications of GPS.

Applications: Photogrammetry, Remote Sensing and Geographical information Systems

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Chang, K. T. (2006). Introduction to Geographic Information Systems. The McGraw-Hill.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
4. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
5. Parkinson,B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications (Volume-I). AIAA, USA

REFERENCE BOOKS:

1. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
2. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt.Ltd, 2013.
3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prentice hall, New Jersey
4. Paul Wolf, Elements of Photogrammetry, McGraw Hill.
5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Interscience
6. Burrough, P. P. &McDonnel, R. A. (1998). Principles of GIS. Oxford University Press.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - V

RAILWAY AND AIRPORT ENGINEERING
IV B.Tech – II Semester (Code : 18CED51)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Prerequisites: Surveying (18CE302)
Highway Engineering (18CE604)

Course Objectives:
CO1: To discussvarious components of railway track and their requirements.
CO2: To design the geometrics of railway track.
CO3: To design the runway geometric.
CO4: To design the runway pavement and discuss various facilities of a harbor and port.
.

Course Outcomes: Student will be able to
CLO1: Choose various components for laying a railway track.
CLO2: Design the various geometrical elements of a railway track.
CLO3: Plan and design runway geometrics and airfield pavements.
CLO4: Determine the crust thickness of the runway pavement and describe the harbor components.

UNIT-I

1. INTRODUCTION TO RAILWAYS
Comparison of railway and highways transportation; Classification of Indian railways.

2. COMPONENTS OF RAILWAY TRACK
Gauges in Railway Track, Coning of Wheels, Permanent way-Rails-Types, Rail failures, Creep of Rails,Rail Joints-Types of Joints, Sleepers-Types, Comparison of sleepers, Ballast and formation-Types of Ballast materials- Specifications of Indian Railways.

UNIT-II

3. GEOMETRIC DESIGN OF RAILWAY TRACK
Geometric Design Of Track-Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve.

4. POINTS AND CROSSINGS & SIGNALLING
Switches, Components and types of crossing, Turnouts and its working principle, Classification of signals.

UNIT-III

5. AIRPORT PLANNING AND DESIGN

Aero plane components; Air–craft characteristics; Selection of site for airport; Typical airport layouts; Airport Obstructions-Zoning laws; Classification of obstructions;

6. RUNWAY DESIGN

Runway Design-Runway orientation; Basic runway length; Corrections for elevation; Temperatureand gradient; Runway geometric design

UNIT-IV

7 .AIRFIELD PAVEMENT DESIGN

Design of Airport Pavements- Design methods for flexible airfield Pavement- CBR Method, Mcleod Method and rigid pavement Design- PCA Method; LCN Method of pavement design.

8. HARBOUR ENGINEERING

Harbour layout: types of harbours, port terms, site selection, Break Waters, Piers and wharves, dry docks and slipwaves.

Text Books

1. Railway Engineering by S.C.Saxena and S.AroraDhanpatRai Publications (P) Ltd.
2. Airport Planning and Design by S. K. Khanna& M. G. Arora; Nemchand& Bros, Roorkee
3. Dock And Harbour Engineering by Dr. S.P. Bindra, DhanpatRai& Sons

Reference Books

1. Railway Engineering by M.M.Agarwal; Prabha& Co, New Delhi
2. Airport Engineering by G.V.Rao; Tata McGraw Hill, New Delhi.
3. Dock And Harbour Engineering by Hasmukh P. Oza, Gautam H. Oza, Charotar Publishing House, 8th Revised Edition : 2016.

NPTEL :

http://nptel.ac.in/courses/105107123/
http://nptel.ac.in/courses/105101008/
http://nptel.ac.in/courses/114106025/

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - V

GROUND WATER DEVELOPMENT AND MANAGEMENT
IV B.Tech – II Semester (Code : 18CED52)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

COURSE OBJECTIVES:

1. To provide knowledge on groundwater availability and distribution in different types of rocks
2. To demonstrate the groundwater movement and groundwater reservoir parameters
3. To develop the skills needed for ground water investigation
4. To study the concept of artificial recharge of ground water
5. To estimate the groundwater management concepts

COURSE OUTCOMES:

The student will be able to

1. Understand the location of ground water and the relationship with the rock type.
2. Assess the ground water movement and reservoir parameters
3. Use of the different techniques of ground water investigation
4. Apply RS & GIS techniques for artificial recharge of groundwater.
5. Apply conjunctive use technique for effective management of groundwater.

UNIT I

Introduction:

Ground Water Occurrence, Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

Ground Water Movement:

Permeability, Darcy's law, storage coefficient, Transmissivity, differential equation governing ground water flow in three dimensions derivation, Ground water flow contours and their applications.

UNIT II

Analysis of Pumping Test Data – Steady flow

Steady flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well and well tests.

Analysis of Pumping Test Data- Unsteady flow

Unsteady flow towards a well – Non equilibrium equations – Theis solution – Jocob and Chow's simplifications, Leaky aquifers.

UNIT III

Surface and Subsurface Investigation

Surface methods of exploration - Electrical resistivity and Seismic refraction methods.Subsurface methods – Geophysical logging and resistivity logging.Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

Artificial Recharge of Ground Water

Concept of artificial recharge – recharge methods, relative merits. Applications of GIS and RemoteSensing in Artificial Recharge of Ground water along with Case studies.

UNIT IV

Saline Water Intrusion

Occurrence of Saline Water intrusion– Relation between fresh and saline waters – Ghyben–Herzberg equation – Shape and structure of fresh–salt water interface – Upcoming of saline water – Control of saline water intrusion – Examples of seawater intrusion.

Groundwater Modelling and Management Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

LEARNING RESOURCES:

TEXT BOOKS

1 Groundwater by H.M. Raghunath, New Age International, 2008.
2 Ground water Hydrology by David Keith Todd, John Wiley & Sons, 1980

REFERENCES:

1. Fundamentals of Ground Water by Franklin W. Schwartz and Hubao Zhang, Wiley India Pvt.Ltd., 2012.
2. Groundwater System Planning & Management by R. Willis & W.W.G. Yeh, Printice Hall,1987.

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - V

FINITE ELEMENT ANALYSIS
IV B.Tech – II Semester (Code : 18CED53)

Lectures	4	Tutorial	0		Practical	0	Credits	3
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50

Course Objectives:

1. Equip the students with the fundamentals of finite element analysis
2. Enable the students to formulate the design problems into FEA
3. Enable the students to solve Boundary value problems using FEM

Course Outcomes

1. Understand the basic concept of FEM
2. Solve simple boundary value problems using Numerical technique of Finite element method
3. Develop finite element formulation of one dimensional and beam problems and solve them
4. Develop FEM formulation of truss element
5. Compute plain stresses and plain strains problems

UNIT -I

1. **BASIC PRINCIPLES OF STRUCTURAL MECHANICS:** A brief history of F.E.M, Need of the method, Applications of FEM, Review of basic principles of solid mechanics, Basic equation in Elasticity Equations of equilibrium, Constitutive relationship, Concept of Axi-symmetric elements. Concept of Energy Principles and method
2. **ELEMENT PROPERTIES:** Basic theory relating to the formulation of the finite element method, element shapes ,nodes , nodal degree of freedom, node numbering, Coordinate system (local and global), Convergence requirements, Compatibility requirement, Geometric Invariance

UNIT-II

3. **Finite element analysis of - single bar element**: (One –Dimensional problem) – Shape functions, derivation of stiffness matrix, stress-strain relations– All with reference to bar element and trusses under axial forces.
4. **Finite element formulation of beam elements**: Beam stiffness-assemblage of beam stiffens matrix- example on analysis of beam subjected to concentrated and distributed loading

UNIT-III

5. **Finite element formulation of truss element**: Stiffens matrix-properties –selection of approximate displacement functions'- solutions of a plane truss –transformation matrix – Galerkins's method for 1-D truss-Computation of stress in a truss element.

UNIT-IV

6. **PLANE STRESS AND PLANE STRAIN ANALYSIS:** Finite element formulation for plane stress and plane strain problems Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces
7. **Iso-parametric formulation**: An isoparametric bar elements-plane bilinear isoparametric element-quadratic plane element-shape funcations evaluations of stiffness matrix,

TEXT BOOK:

1.Finite Element Analysis - Theory and Programming by C. S. Krishnamoorthy; Tata Me Graw - Hill Publishing Co.Ltd., New Delhi

2. "Introduction to Finite Elements in Engineering", Tirupathi R. Chandrupatla, Ashok D

3. Finite Element Analysis", by S.S.Bhavikatti, New Age International Publishers

REFERENCE BOOK:

1. Introduction to the Finite Element method - A Numerical method for engineering analysis by Desai & Abel; CBS Publishers & Distributors., Delhi

2. The finite element method in engineering by S. S.Rao, Butterworth-Heinemann, New Delhi, 1999

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Elective - V

SOLID AND HAZARDOUS MANAGEMENT
IV B.Tech – II Semester (Code : 18CED54)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

UNIT –I

Municipal Solid Waste Management – Fundamentals

Introduction of solid waste;Sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options

UNIT-II

Hazardous Waste Management – Fundamentals

Characterization of waste; compatibility and flammability of chemicals; fate and transport of chemicals; health effects

UNIT- III

Physicochemical Treatment of Solid and Hazardous Waste

Chemical treatment processes for MSW (combustion, stabilization and solidification of hazardous wastes); physicochemical processes for hazardous wastes (soil vapor extraction, air stripping, chemical oxidation); ground water contamination and remediation

UNIT – IV

Biological Treatment of Solid and Hazardous Waste

Composting; bioreactors; anaerobic decomposition of solid waste; principles of biodegradation of toxic waste; inhibition; co-metabolism; oxidative and reductive processes; slurry phase bioreactor; in-situ remediation

References/Text Books:

1. VesilindP.A.,WorrellW.andReinhartD.R.,"SolidWasteEngineering",Thomson Books.
2. BhideA.D.andSundaresanB.B.,"SolidWasteManagement,Collection,Processingand Disposal",Nagpur.
3. Pichtel,John.WasteManagementPractices:Municipal,HazardousandIndustrial.CRC Press, Taylor and Francis Group,2005.
4. LaGrega,MichaelD.,Buckingham,PhilipL.andEvans,JeffreyC.HazardousWaste Management. Waveland Press Inc., Reissue Edition,2010.

Video Lectures (Web Links):

1. http://nptel.ac.in/courses/105106056/

BAPATLA ENGINEERING COLLEGE : : BAPATLA
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Elective - VI

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
IV B.Tech – II Semester (Code : 18CED61)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

COURSE OBJECTIVES

1. Understand the basic concepts of structural dynamics under free vibration and forced vibration.
2. Know the geo technical factors which are affecting the earthquake engineering.
3. Analysis of buildings subjected to earthquake forces by using equivalent static method as per the IS:1893 – 2016
4. Design and Detailing of buildings as per IS: 13920 – 1993 and few concepts of masonry structures to make earthquake resistant.

LEARNING OUTCOMES

1. Comprehensive analysis of structures subjected to free and forced vibration of single degree of freedom systems.
2. Learning earthquake engineering fundamentals and elements of Geo-technical engineering such as liquefaction and slope stability analysis.
3. Analysis of single storey and single bay RCC plane frames subjected to lateral forces.
4. Design of single storey and single bay RCC plane frames and its sub parts like beam, column, footing and Detailing as per IS: 13920 – 1993.

UNIT-I

1) Elements of structural dynamics

Sources of vibrations; Types of vibrations; Degrees of freedom; Spring action and damping; Free vibration of undamped system having single degree of freedom; Free vibration of viscous damped system having single degree of freedom; Forced vibration of a viscous damped single degree freedom system subjected to harmonic excitation; Earthquake excitation (Base excitation) of a single degree freedom system.

UNIT-II

2) Elements of Earth Quake Ground motion

Earthquake size- Intensity and magnitude; Seismic Zoning-Introduction; Strong Motion Earthquakes - Introduction; Response spectrum (elastic); Local site effect (Effect of type of soil).

3) Elements of GeotechnicalEarthquake Engineering

Liquefaction – Definition and types, Effect of liquefaction on built environment, Evaluation of liquefaction susceptibility, Liquefaction hazard mitigation

Seismic slope stability – Introduction, Pseudo-static analysis, Sliding block methods

UNIT III

4) Analysis of single storey and single bay RCC Plane Frame (Columns vertical) : (As per IS:1893(part-I)-2016)

Calculation of lateral force due to earthquake using equivalent static method ; Analysis for different load combinations; Design forces and moments in beam and columns.

UNIT-IV

5)Design of single storey and single bay RCC plane frames (Columns vertical)

(As per IS:456-2000 and IS13920-2016)

Design of column; Design of beam; Design of footing ; Detailing of entire frame

6) Masonry Structures

House types and damages, cause and location of damage, Understanding the knowledge hidden in your existing houses, Making houses earthquake resistant, Earthquake resistant features, Retrofitting-some examples, Technology choice, summary of earthquake resistant features, improving housing designs.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1)Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh Chandra, Second Edition(1994), South Asian Publishers, New Delhi.

2) Geotechnical Engineering - S.K.Gulati&ManojDatta, Tata McGraw-Hill Publishing Company Ltd.

3)Earthquake Resistant Design of Structures by PankajAgarwal, Manish Shrikhande , First edition(2006), Prentice Hall of India Private Ltd., New Delhi .

4) Earthquakes and Buildings – A.S.Arya, A.Revi, Pawan Jain

CODES

IS:1893(part-I)-2016-
IS13920-2016 -
IS:456-2000 -
SP16

REFERENCE BOOK

1) Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd

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Elective - VI

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

IV B.Tech – II Semester (Code : 18CED62)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

UNIT – I

Basic concept of EIA

Definition,InitialenvironmentalExamination,ElementsofEIA,-factorsaffectingE-I-AImpact evaluation and analysis, preparation of Environmental Base map, Classification of environmentalparameters.

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.

UNIT – III

E I A in soil, surface water, Air and Biological environment

Introduction and Methodology for the assessment of soil and ground water, Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and incorporation of mitigation measures

Methodologyfortheassessment ofImpactsonsurfacewater environment,Air pollutionsources, generalized approach for assessment of Air pollutionImpact.

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT – IV

Environmental Audit & Environmental legislation

Objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

References/Text Books:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar,KAKINADA.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
3. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K., Katania&Sons Publication.,NewDelhi.
4. EnvironmentalPollutionandControl,byDrH.S.Bhatia–GalgotiaPublication(P)Ltd,Delhi

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V &-VI syllabus for MID-III examinations.

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Elective - VI

PAVEMENT ANALYSIS AND DESIGN
IV B.Tech – II Semester (Code : 18CED63)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Prerequisites: Soil Mechanics (18CE506)
Highway Engineering (18CE604)

Course Objectives:

CO1: To discuss the Variables Considered in Pavement Design.
CO2: To discuss the various stresses induced in pavements.
CO3: To assess the properties of materials and mixes.
CO4: To design the flexible and rigid pavements.

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Course Outcomes: Student will be able to

CLO1: Assess the factors Considered in Pavement Design.
CLO2: Analyse the stresses induced flexible and rigid pavements.
CLO3: Characterize the response characteristics of soil, aggregate, asphalt, and asphalt mixes.
CLO4: Determine the crust thickness of the flexible and rigid pavement.

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: Stress Inducing Factors in Flexible and Rigid pavements. Stresses 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

UNIT – III

Material Characteristics: Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient and Complex (Dynamic)

Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilization and Use of Geo Synthetics.

UNIT – IV

Design of Pavements: Flexible Pavement Design by IRC Method, Concepts of Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO.
Rigid Pavements: IRC Method of Design,Concepts of PCA & AASHTO method.
Pavement design for low volume roads, rural road designs – code of practice.
Design of Overlays: Types of Overlays, Suitability, Design of overlays.

Text/Reference Books:

1. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc
2. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros.
3. Relevant codes from Indian Roads Congress (IRC:37-2018)for design of Flexible and Rigid Pavements(IRC:58-2015) and overlay design, Bureau of Indian standards (BIS), Ministry of Road Transport and Highways (MoRT&H-2013), and Asphalt Institute Manuals (AI).

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Elective - VI

TOWN PLANNING AND ARCHITECTURE
IV B.Tech – II Semester (Code : 18CED64)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:
CO1: To discuss the history of architecture and design.
CO2: To discuss the historicalbackgroundoftownplanning
CO3: To discuss the planning theory and principles of planning.
CO4: To discuss development of smart cities
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Course Outcomes: Student will be able to
CLO1: Understandthe history of architecture and design..
CLO2: Understand the historicalbackgroundoftownplanning
CLO3: Under the planning theory and principles of planning
CLO4: Understand the development of smart cities

UNIT–I

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures. IndianArchitecture: Vedicage, Indusvalley civilizationBuddhistperiod: Stambas, Stupa, Toranas, Chaityas, ViharasHindutemples: Dravidian and IndoAryanStylesTemple of Aihole, Madurai, Bhuvaneshwar, MountAbu. IndoSarsanic(Islamic)Architecture: Mosque -Palace - Fort-Tomb.
Architectural Design:
Principles of designing–Composition of Plan relationship between plan and elevation building elements, form, surface texture, mass, line, color, tone, Principles of Composition: Unity,contrast, proportion, scale, balance, circulation, rhythm, character and expression.

UNIT–II

HistoricalBackGroundofTownPlanning: Town planning in ancient- medieval, renaissance, industrial and post-industrial cities;Contribution of individuals to city planning-Lewis Mumford, Patric Geddes, Peter Hall etc; Acropolis(Greece), Jerusalem, Mecca, Rome, London.
Town planning in India–Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Chandigarh etc;

UNIT–III

Planning Theory: Theories of urbanization including Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and other latest theories, Land use and land value theory of William

Alonso; Ebenezer Howard's Garden City Concept; Green Belt Concept.

PrinciplesofPlanning: Principles of planning aresidence-site selection, site orientation-aspect, prospect, grouping, circulation, privacy, furniture requirements, services and otherfactors.Types of Development Plans.

UNIT–IV

Building Systems:HVAC, Acoustics, Lighting; LEED ratings;
Development of Smart cities: Definition, introduction, fundamentals, possible systems required for a typical Smart City, Case studies.

TEXTBOOKS:

1. 'The great ages of WorldArchitecture' byG.K. Hiraskar.
2. 'Planningand Design ofBuildingsbySectionofArchitecture'byY. S. Sane.
3. 'ProfessionalPractice'byG.K.Krishnamurthy,S.V.Ravindra,PHILearning, NewDelhi.
4. 'IndianArchitecture–Vol.I&II'byPercyBrown,TaraporevalaPublications, Bombay.
5. 'Fundamentals ofTownPlanning'byG.K. Haraskar.

REFERENCES:

1. 'Drafting and Design for Architectureby Hepler, Cengage Learning
2. 'Architect's Portable Handbook' byJohnPattenGuthrie–McGraw Hill International Publications.
3. 'Mordern Ideal Homes for India' byR.S. Deshpande.
4. 'TownandCountyPlanning'byA.J.BrownandH.M.Sherrard.
5. 'TownDesign'byFederikGlbbard,Architecturalpress,London.

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PROJECT - II
IV B.Tech – II Semester (Code : 18CELP02)

Lectures	0	Tutorial	0		Practical	3	Credits	1
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			50