BOARD OF STUDIES MEETING – 2022-23

K.S.R.M COLLEGE OF ENGINEERING

AUTONOMOUS

Minutes of the Meeting

Date	**17.12.2022**	**Day**	**Saturday**
Time	**11:00 AM**	**Venue**	**CADD Lab., Dept. of Civil Engg.**
Dept./SS	**CE**	**Convener**	**Dr. N. Amaranatha Reddy**

Members Present:13

Members Absent: 00

S.No	Name	Designation	Signature	S.No	Name	Designation
1.	Prof. M. Amaranath Reddy	Prof., IIT Kharagpur				
2.	Prof. Santhosh G. Thampi	Prof., NIT Calicut				
3.	Prof. R. Bhavani	Prof., JNTU Ananthapur				
4.	Dr. M. Srinivasula Reddy	Associate Prof., GPRCE				
5.	Sri. Sunil Kumar Reddy Kasa	Associate Director, AECOM				
6.	Dr. N. Amaranatha Reddy	Associate Prof., KSRMCE				
7.	Prof. G. Sreenivasa Reddy	Prof., KSRMCE				
8.	Prof. T. Kiran Kumar	Prof., KSRMCE				
9.	Prof. V. Giridhar	Prof., KSRMCE				
10.	Dr. V. Ramesh Babu	Associate Prof., KSRMCE				
11.	Dr. P. Kishore Kumar Reddy	Associate Prof., KSRMCE				
12.	Sri. P. Suresh Praveen Kumar	Assistant Prof., KSRMCE				
13.	Sri. P. Rajendra Kumar	Assistant Prof., KSRMCE				

Dr. N. Amaranatha Reddy, welcomed all the members to the meeting and presented the agenda of the meeting.

The resolutions are:

	To do item	Discussion	Resolution	Coordinator/in-charge
1	Approval of VII and VIII Semester syllabus of R20UG Regulation	The Head of the Department has presented the syllabus designed by the faculty of by considering the stakeholders feedback & action taken report, suggestions of Department Review Committee and by comparing with premier institute syllabus	• The committee suggested to remove ethical audit portion in Environmental Impact Analysis course. • The committee suggested to reduce the fifth unit syllabus content of traffic engineering course. • The committee suggested to convert the syllabus of skill oriented course as unit wise instead on experiments. • The committee suggested to offer Industrial Safety Engineering course as open elective course.	Dr. N. Amaranatha Reddy
2	To finalize and approve the syllabus for New Courses, Value Added Courses, Certificate Courses, Skill Courses, Employability Courses and Entrepreneurship Courses.	The Head of the Department has presented the syllabus designed by the faculty of CE by considering the stakeholders feedback & action taken report, suggestions of Department Review Committee and by comparing with premier institute syllabus	The committee approved the content for offering New Courses, Value Added Courses, Certificate Courses, Skill Courses, Employability Courses and Entrepreneurship Courses to implement in 2023-24.	Prof. G. Sreenivasa Reddy

The Head of the Department have proposed the Vote of thanks and Concluded the meeting.

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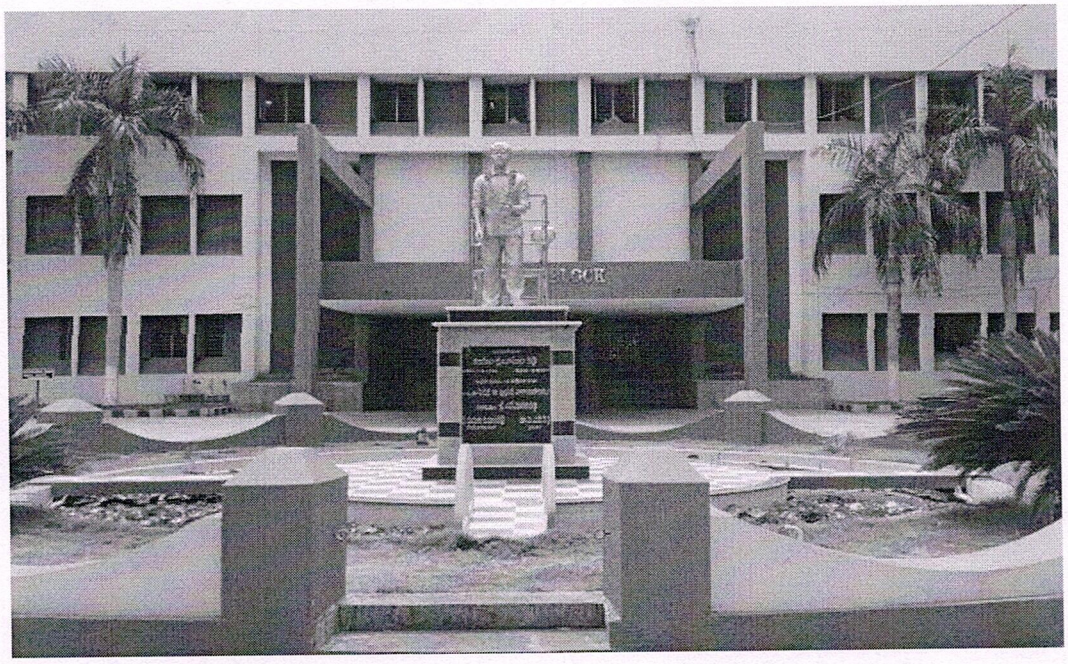
Convenor

Regulations for

UG Programs in Engineering (R20UG)

(Effective from 2020-21 for Regular students and from 2021-22 for Lateral Entry students)



Kandula Srinivasa Reddy Memorial College of Engineering

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Kadapa – 516005, A.P.

(Approved by AICTE, Affiliated to JNTUA, Ananthapuramu, Accredited by NAAC)

(An ISO 9001-2008 Certified Institution)

Department of Civil Engineering
R20UG - Curriculum

B. Tech. - I Semester

Course code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2021101	BSC	Linear Algebra and Calculus	3	0	0	40	60	3
20EP102	BSC	Engineering Physics	3	0	0	40	60	3
2024103	HSMC	Communicative English	3	0	0	40	60	3
2014104	ESC	Basic Electrical & Electronics Engineering	3	0	0	40	60	3
2003105	ESC	Engineering Drawing	1	0	2	40	60	2
2003106	ESC	Engineering Drawing Lab	0	0	2	40	60	1
20EP107	BSC	Engineering Physics Lab	0	0	3	40	60	1.5
2024108	HSMC	Communicative English Lab	0	0	3	40	60	1.5
2014109	ESC	Basic Electrical & Electronics Engineering Lab	0	0	3	40	60	1.5
Total			**13**	**0**	**13**	**360**	**540**	**19.5**

L - Lecture, T - Tutorial, P – Practical

B. Tech. - II Semester

Course code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2021201	BSC	Differential Equations and Vector Calculus	3	0	0	40	60	3
20EC202	BSC	Engineering Chemistry	3	0	0	40	60	3
2005203	ESC	C-Programming & Data Structures	3	0	0	40	60	3
2001204	ESC	Strength of Materials	3	0	0	40	60	3
20EW205	LC	Engineering Workshop	0	0	3	40	60	1.5
2005206	LC	IT Workshop	0	0	3	40	60	1.5
20EC207	BSC	Engineering Chemistry Lab	0	0	3	40	60	1.5
2005208	ESC	C-Programming & Data Structures Lab	0	0	3	40	60	1.5
2001209	ESC	Strength of Materials Lab	0	0	3	40	60	1.5
20MC210	MC	Environmental Science	3	0	0	40	0	0.0
Total			**15**	**0**	**15**	**400**	**540**	**19.5**

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B. Tech. - III Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2021302	BSC	Probability, Statistics & Numerical Methods	3	0	0	40	60	3
2001302	ESC	Geology and Building materials	3	0	1	40	60	3.5
2001303	PCC	Advanced Strength of materials	3	1	0	40	60	4
2001304	PCC	Fluid Mechanics	3	0	0	40	60	3
2001305	PCC	Geomatics	3	0	0	40	60	3
2001306	PCC (LAB)	Fluid Mechanics Laboratory	0	0	3	40	60	1.5
2001307	PCC (LAB)	Geomatics Lab	0	0	3	40	60	1.5
20013S1	SOC	Civil Engineering Workshop (Skill oriented)	1	0	2	40	60	2
Total Credits			**16**	**1**	**9**	**320**	**480**	**21.5**

B. Tech. - IV Semester

Course Code	Category	Course Title	Hours/Week			IM	EM	CR
			L	T	P			
2025401	HSS	Business Economics and Accounting for Engineers	3	0	0	40	60	3
2001402	PCC	Hydraulics & Hydraulic Machinery	3	0	0	40	60	3
2001403	PCC	Soil Mechanics	3	0	0	40	60	3
2001404	PCC	Structural Analysis	3	0	0	40	60	3
2001405	PCC	Transportation Engineering	3	0	0	40	60	3
2001406	BSC (LAB)	Building Planning and Drawing (AutoCAD)	0	0	3	40	60	1.5
2001407	PCC (LAB)	Soil Mechanics Laboratory	0	0	3	40	60	1.5
2001408	PCC (LAB)	Transportation Engineering Laboratory	0	0	3	40	60	1.5
20014S2	SOC	Advanced Civil Engineering Workshop (Skilloriented-2)	1	0	2	40	60	2
2024410	HSMC	Universal Human Values	3	0	0	40	60	3
Total			**19**	**0**	**11**	**400**	**600**	**24.5**

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B. Tech. - V Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001501	PCC	Hydrology & Irrigation	3	0	0	40	60	3
2001502	PCC	Foundation Engineering	3	0	0	40	60	3
2001503	PCC	Concrete Technology	3	0	0	40	60	3
2001504	PEC-I	Optimization Techniques in Civil Engineering	3	0	0	40	60	3
2001505		Advanced Structural Analysis						
2001506		Remote Sensing & GIS						
	OEC-I		3	0	0	40	60	3
2099510	MC	Management Organizational behaviour	2	0	0	40	00	0
2001507	PCC	Concrete Technology Lab	0	0	3	40	60	1.5
2001508	PCC	Structural Analysis and Design Lab (Staad Pro)	0	0	3	40	60	1.5
20015S3	SC	SketchUp-3D modelling	1	0	2	40	60	2
2001509	PROJ	Community Service Project	0	0	3	100	-	1.5
Total			**18**	**00**	**11**	**460**	**480**	**21.5**

B. Tech. - VI Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001601	PCC	Environmental Engineering	3	0	0	40	60	3
2001602	PCC	Water Resources Engineering	3	0	0	40	60	3
2001603	PCC	Design of Reinforced Concrete Structures	3	0	0	40	60	3
2001604	PEC-II	Pre-stressed Concrete	3	0	0	40	60	3
2001605		Bridge Engineering						
2001606		Traffic Engineering						
2006601	HSSE	Human Resource Development	3	0	0	40	60	3
2006602		Digital Marketing						
2006603		Project Management						
20993M3	MC	Constitution of India	2	0	0	40	00	0
2001607	PCC	Environmental Engineering Lab	0	0	3	40	60	1.5
2001608	PCC	Computer Aided Design and Drafting Lab	0	0	3	40	60	1.5
2001609	PCC	Advanced Concrete Technology Lab	0	0	3	40	60	1.5
20016S4	SC	Advanced English Communication skills lab	1	0	2	40	60	2
Total			**18**	**00**	**11**	**400**	**540**	**21.5**

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B. Tech. - VII Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001701	PEC-III	Ground Improvement Techniques	3	0	0	40	60	3
2001702		Quantity Estimation of structures						
2001703		Finite Element Methods						
2001704	PEC-IV	Design of Steel Structures	3	0	0	40	60	3
2001705		Water Supply Engineering						
2001706		Advanced Concrete Structures						
2001707	PEC-V	Design and Drawing of Irrigation Structures	3	0	0	40	60	3
2001708		Construction Practice and Management						
2001709		Urban Transportation Planning						
	OEC-II		3	0	0	40	60	3
	OEC-III		3	0	0	40	60	3
	OEC-IV		3	0	0	40	60	3
20015S5	SOC-V	Practices in Geo-Technical Engineering	1	0	2	40	60	2
2001710	PR	Industrial/Research Internship	0	0	6	100	-	3
Total			**19**	**00**	**08**	**380**	**420**	**23**

B. Tech. - VIII Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001801	PROJ	Project Work/Internship	-	-	30	50	50	12
Total			**-**	**-**	**30**	**50**	**50**	**12**

Open Electives Courses Offered by Department of Civil Engineering:

20OE101	Disaster Management
20OE102	Basics of Civil Engineering
20OE103	Building Materials
20OE104	Solid Waste Management
20OE105	Estimation and Costing
20OE106	Water Management
20OE107	Repair & Rehabilitation of Structures
20OE108	Geo-Environmental Engineering
20OE109	Environmental Impact Assessment
20OE110	Industrial Safety Engineering
20OE111	Surveying
20OE112	Traffic Engineering

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B. Tech., VII Semester

Course Title	Ground Improvement Techniques					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2001701	Professional Elective (PEC III)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To learn and understand various ground improvement technique.
- To learn various method of compaction for ground improvement in its strength.
- To learn various physical and chemical modification for ground improvement
- To learn the method to choose the foundation and or treatment method based on the site condition

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

CO 1	Select the ground improvement technique which is suitable and economical for soil strengthening.
CO 2	Select different techniques based on the various types of soils in-situ
CO 3	Design reinforced earth structures
CO 4	Exposed to the knowledge on use of geosynthetic material

UNIT-I

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

STABILISATION: Methods of stabilization-mechanical-cement- lime bituminous- chemical stabilization with calcium chloride, sodium silicate and gypsum.

UNIT-II

DENSIFICATION METHODS IN GRANULAR SOILS:-In – situ densification methods in granular Soils – Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

DENSIFICATION METHODS IN COHESIVE SOILS:–In – situ densification methods in cohesive soils – preloading or dewatering, vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT-III

DEWATERING: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis.

GROUTING: Objectives of grouting- grouts and their properties-grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

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UNIT-IV

REINFORCED EARTH: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

UNIT-V

EXPANSIVE SOILS: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles

Text Books:

1. Dr. P. Purushothama Raj., "Ground Improvement Techniques", Lakshmi Publications Pvt. Ltd.
2. Jones, J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1985.
3. Koerner, R.M. and Welsh, J.P., Construction and Geotechnical Engineering using Synthetic Fabrics, John Wiley, 1990.
4. Koerner, R.M., Designing with Geosynthetics (Third Edition), Prentice Hall, 1997.

Reference Books:

1. Moseley, M.D., Ground Treatment, Blackie Academic and Professional, 1998.
2. Hehn, R.W., Practical Guide to Grouting of Underground Structures, ASCE, 1996.
3. Das, B.M., Principles of Foundation Engineering, (Fourth Edition). PWS Publishing, 1999
4. Foundation Analysis and Design by Joseph E. Bowles; McGraw – Hill International Book Company 2

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B. Tech., VII Semester

Course Title	Quantity Estimation of Structures					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2001702	Professional Elective (PEC III)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To impart basic knowledge on Estimation of structures and understand how to Estimate the quantities of engineering projects
- To know the importance of specifications in final cost of the structure.
- To understand how to prepare the rate of the different item of works with SSR and Data book
- To understand the contractual system in public works and know the importance of Valuation
- To gain basic knowledge on quantity estimation of other Civil Engg Structures ed

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

CO 1	Acquire basic knowledge on Estimation of Building structures
CO 2	Understand specification influence on cost of the items
CO 3	Expertize on preparing rate of the item per unit
CO 4	Understand the contractual system and valuation of the structures
CO 5	Expertize on preparing the estimation of other Civil Engg structures

UNIT-I

INTRODUCTION TO THE ESTIMATION

Importance of Estimation for Structures, units and items of works in structures, Methods of Estimation, Quantity Estimation of Single Room, Double Room and Multiple Rooms with Long wall and Short wall methods and Framed Structures

ESTIMATION OF BAR BENDING SCHEDULE: Beams, columns, Slabs, Staircases, Sun shade, Lintels.

UNIT – II

SPECIFICATIONS OF DIFFERENT ITEM OF WORKS

Specification of different items of works: Earth work for foundations, mortars, Plain cement concrete, Reinforced concrete roofing, Brick work, Stone masonry, RCC roof and AC roof and GI sheet roof structures, plastering, Painting, pointing and wood works.

UNIT – III

RATE ANALYSIS:

Rate Analysis of different item of works: Earthwork Excavation, Mortars of various proportions (cement and lime) – Concrete with various proportions (lime and Cement) – Brick Masonry,

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Stone Masonry, Pointing, Painting, Plastering, cement concrete flooring with 1:2:4 mix, Ceramic and Vitrified Tile flooring.

UNIT – IV

CONTRACTS AND VALUATION:

CONTRACTS: Types of contracts, contract document, conditions of contracts, contract procedure, termination of contracts, arbitration and tenders.

VALUATION: Introduction, Technique of valuation, elements of valuation and factors affecting valuation, methods of valuation.

UNIT – V

ESTIMATION OF IRRIGATION AND ROAD STRUCTURES

Estimate of bituminous and cement concrete roads, estimate of retaining walls, Estimation of Canals Dam structures

Text Books:

1. B N Dutta "Estimating and Costing in Civil Engineering", U B S Publishers Distributers Pvt. Limited, Noida.
2. "Standard Data Book – Vol.2", Andhra Pradesh Department of Standard Specifications, Amaravati.
3 Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad
4G.S. Birdie, Estimating and Costing, Danpatrai Publications, New Delhi, 2009

Reference Books:

1. S C Rangwala "Estimating Costing and Valuation", Charotar Publishing House Pvt. Limited, Anand.
2. M. Chakraborthi, Estimating Costing Specification and Valuation in CivilEngineering,23rd Edition, Laxmi Publications, New Delhi, 2010.

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B. Tech., VII Semester

Course Title	Finite Element Method					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2001703	Professional Elective (PEC III)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

To understand the concepts of Finite element methods to analyze critical stress conditions in structures.

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

CO 1	Understanding of the fundamental theory of the FEM
CO 2	Demonstrate the differential equilibrium equations and their relationship
CO 3	Demonstrate the displacement models and load vectors
CO 4	Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plate elements.
CO 5	compute the stiffness matrix for isoperimetric elements and develop suitable software tools for analysis purpose

UNIT - I

INTRODUCTION TO FINITE ELEMENT METHOD: Basic Concepts of FEM, Limitations, Finite Element Modelling and Discretization, Types of Elements, Nodes and Degrees of Freedom, Interpolation and ShapeFunctions

UNIT– II

ONE DIMENSIONAL: Local and Global coordinate systems - Finite element modelling - Stiffness matrix for Bar element, Flexure element - Element load vector - Equivalent nodal loads.

TRUSSES: Plane Trusses - Local and Global Coordinate Systems - Direction Cosines - ElementStiffness Matrix - Assembly of Global Stiffness Matrix - Stress Calculation.

UNIT – III

TWO-DIMENSIONAL ELEMENTS: Two Dimensional Elements- Different types of elements for plane stress and plane strain analysis – Displacement models– generalized coordinates – shape functions – convergent and compatibility requirements –Geometric invariance – Natural coordinate system – area and volume coordinates.

UNIT - IV

ISO-PARAMETRIC ELEMENTS AND FINITE ELEMENT MODELLING: Mesh Requirements - Material Properties - Loads and Reactions - Boundary Conditions - Checking the Model - Analysis andDesign Software (For Practice Purpose Only)

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UNIT - V

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

APPLICATIONS OF FEM: Plate bending problems - Finite elements in Fluid mechanics – Finite elements to elastic stability

Text Books:

1. Daryl L Logan "A First Course in the Finite Element Method", Cengage Learning India Private Limited, New Delhi.
2. S S Bhavikatti "Finite Element Analysis", New Age International (P) Limited, Publishers, New Delhi.
3. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers
4. Finite element analysis by S.S. Bhavakatti-New age international publishers

Reference books:

1. Robert D Cook, David S Malkus and Michael E Plesha "Concepts and Applications of Finite Element Analysis", Wiley India Pvt. Limited, New Delhi.
2. George R Buchanan "Theory and Problems of Finite Element Analysis", Tata McGraw-Hill Companies, Inc. New York.
3. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press, Hyderabad.
4. Finite Element Analysis for Engineering and Technology, Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad. 2003.

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B. Tech., VII Semester

Course Title	Design of Steel Structures					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2001704	Professional Elective (PEC IV)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- The student acquires knowledge about elastic & plastic methods to analyze the structural elements.
- The students understand about different types of tension & compression members and to analyze easily by limit state design.
- To make the student able to analyze various beams like laterally supported & laterally unsupported beams.
- To make the students to understand the beam to beam & beam to column connections.
- Students easily understand the design of slab base and gusseted based and subjected to moments.

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

CO 1	Understand the plastic theory and analysis of ultimate load
CO 2	Understand the welding and its types and applications.
CO 3	Deign the tension and compression members
CO 4	Design the flexural member
CO 5	Design the Beam to Column Connections and column bases

UNIT – I

INTRODUCTION: Loads & Load combinations: Appraisal of loading standards such as I.S, I.R.C Effect of wind and earthquake on structure.

PLASTIC ANALYSIS: Introduction – Idealized Stress – Strain Diagram – Shape Factors for VariousSections – Moment Curvature Relationship – Ultimate Moment – Plastic Hinge – Lower andUpper Bound Theorems – Ultimate Strength Fixed and Continuous Beams – Frames.

UNIT – II

WELDED CONNECTIONS: Introduction – Advantages and Disadvantages of Welding – Strength ofWelds – Butt and Fillet Welds – Permissible Stresses – IS Code Requirements – Design of Welds Subjected to Moment Acting in the Plane and at Right Angles to the Plane of the Joints – Beamto Beam and Beam to Column Connections.

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UNIT – III

DESIGN OF TENSION MEMBERS: Types of Sections – Net Effective Section for Angles and Ties in Tensions - Lug Angles – Tension Splices

DESIGN OF COMPRESSION MEMBERS: Plain and Built-Up Compression Members – Assumptions RegardingEnd Conditions – Design of Built-Up Columns with Battens and Lacings – Splicing of Column.

UNIT – IV

DESIGN OF BEAMS: Allowable Stresses – Design Requirements as per IS Code – Design of Simple and Compound Beams- Curtailment of Flange Plates – Beam to Beam Connections – Check for Deflections –Shear – Buckling – Check for Bearing – Laterally Unsupported Beams.

UNIT – V

DESIGN OF BEAM TO COLUMN CONNECTIONS: Introduction – Design of Beam to Column Connections – Framed, Stiffened, Un-Stiffened and Seated Bracket Connections. Design of Column Bases: Design of Slab Base and Gusseted Bases – Column Bases subjected to Moment.

Text books:

1. S K Duggal "Limit State Design of Steel Structures", Tata McGraw-Hill Companies, Inc. NewYork.
2. S S Bhavikatti "Design of Steel Structures", I K International Publishing House Pvt. Limited, New Delhi.
3. Design of steel structures by M Raghupathi Tata MC Graw –Hill
4. Steel structures by Subramanian N, Oxford Higher Education, New Delhi

Reference Books / Is Codes / Tables:

1. IS 800 – 2007 "Indian Standard Code of Practice for General Construction in Steel", Bureau of Indian Standards, New Delhi.
2. IS 875 – Part – 3 "Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Building and Structures – Wind Loads", Bureau of Indian Standards, NewDelhi.
3. K L V Ramu and Subhash Chander "Steel Tables – SI Units", Jain Brothers, New Delhi.
4. Limit state Design of steel structures by S.K. Duggal Tata MCgraw Hill, New Delhi

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B. Tech., VII Semester

Course Title	Water Supply Engineering					B. Tech., VII Semester		
Course Code	Category	L	T	P	Credits	Maximum Marks		
						Continuous Internal Assessment	End Exam	Total
2001705	Professional Elective (PEC IV)	3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hr						End Exam Duration: 3 Hrs		

Course Objectives:

- To import knowledge in water quantity and quality parameters and future demand and forecasts on water
- To study the sources, quality, and standards of water
- To understand various water treatments methods
- To understand the water distribution system from source to destination

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

CO 1	Understand the impact of development of water supply and estimation and Design of public water supply.
CO 2	Interpret the sources, Quality and Standards of drinking water quality Standards.
CO 3	Interpret water treating procedures and design of water treatment methods.
CO 4	Evaluate the advanced water treatment in removal of harmful constituents And water management.
CO 5	Evaluate the water distribution techniques and water distribution system, Its working and plumbing.

UNIT - I

INTRODUCTION: Role of Environmental Engineer - Development of public water supply - Need for protected water supply - Objectives of water supply systems - Per Capita Consumption - Water quantity estimation - population forecast - Arithmetic, Incremental, Geometric methods.

UNIT - II

SOURCES OF WATER: Sources of water - Surface and ground water sources – Infiltration galleries - Infiltration wells.

QUALITY OF WATER: Quality of water - Physical, chemical, and biological aspects - Drinking water quality standards - Water borne diseases.

UNIT - III

TREATMENT OF WATER: Flow chart of water treatment plant – Treatment -

Sedimentation - Coagulation - Filtration - Disinfection methods - Softening of Water – Defluoridation.

UNIT - IV

ADVANCED WATER TREATMENTS: Objectives and types of Aeration - Iron and manganese removal - Demineralization - Desalination - Membrane Systems.

WATER MANAGEMENT: Sustainable Development - Rainwater harvesting methods - Water Pollution - Causes and effects

UNIT - V

WATER DISTRIBUTIONS: Distribution systems - Requirements, Layout of Water distribution systems - Design procedures - Hardy Cross methods - Laying of pipelines - waste detection and prevention - Different types of valves Joints, and fire hydrants.

Text Books:

1. S K Garg, "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi.
2. B C Punmia, Ashok Kumar Jain & Arun Kumar Jain "Water Supply Engineering", LakshmiPublications, New Delhi.
3. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers
4. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, AshokJain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi

Reference Books:

1. H S Peavy, D R Rowe and G Tehobanoglous "Environmental Engineering" Tata McGraw-Hill Companies, Inc. New York.
2. S K Hussain "Water Supply and Sanitary Engineering", Oxford & IBH, New Delhi.
3. K.N. Duggal, Elements of Environmental Engineering, 1st Edition, S.Chand Publishers,New Delhi, 2010.
4. G.S. Birdie and J. S. Birdie, Water Supply and Sanitary Engineering, 8th Edition, DhanpatRai and Sons Publishers, New Delhi, 2010.

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B. Tech., VII Semester

Course Title	Advanced Concrete Structures					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2001706	Professional Elective (PEC-IV)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

To expose students to the design and analysis methodology for designing combined footings, retaining walls, overhead tanks, bridge deck slabs as per standard IS and IRC codal provisions.

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

CO 1	Design combined footings as per limit state design method of IS 456-2000 codal provisions
CO 2	Design & detailing of cantilever and counterfort retaining walls as per IS Codal Provisions
CO 3	Design RCC circular ground level and over-head tanks as per IS code
CO 4	Design RCC rectangular ground level and over-head tanks as per IS code
CO 5	Design RCC bridge deck slab as per IRC codal provisions

UNIT – I

COMBINED FOOTINGS: Limit state design & detailing of combined- rectangular and trapezoidal footings as per IS: 456-2000 Codal Provisions.

UNIT – II

Design & detailing of cantilever and counter-fort Retaining wall as per IS Codal Provisions.

UNIT – III

Elastic Design & Detailing for RCC circular and Rectangular ground level and over-head tanks- Design of staging, Design of Intze tanks as per IS Codal Provisions.

UNIT – IV

Design of Flat slab (Interior panel only)

UNIT – V

Elastic design and detailing of RC bridge deck slab using effective width method and Pigeaud's method as per IRC Codal Provisions.

Text Books:

1. S. Ramanatham, Design of Reinforced Concrete Structures, Dhanpat Rai &Sons, 2002.
2. D.S. Prakash Rao; Design Principles and Detailing of Concrete Structures, Tata McGraw-Hill Publishing Co. Ltd., 1995.
3. Johnson Victor, D., "Essentials of Bridge Engineering", Oxford & IBH Publishing Co., New Delhi, Fourth Edition, 1991
4. *IS 456*:2000 Plain and Reinforced Concrete - Code of Practice.
5. Krishna Raju. N., "Advanced Reinforced Concrete Design", CBS Publishers and

distributors, 2007
6. Unnikrishna Pillai and Devdas Menon ,Reinforced Concrete Design, Tata McGraw HillPublishers Company Ltd., New Delhi, 2006.

Reference Books:

1. Park & Paulay , "Reinforced Concrete", Robert Publisher,1975.
2. Ashok.K. Jain, Nem Chand & Bors. "Reinforced Concrete", Tata McGraw-Hill PublishingCompany Limited, New. Delhi, 2003..
3. Sinha. N. C. and Roy S. K., "Fundamentals of Reinforced Concrete", S. Chand andcompany Limited, New Delhi, 2003.
4. Bungey, Millard, Grantham, "Testing of Concrete in Structures", Taylor and Francis,United Kingdom.

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B. Tech., VII Semester

Course Title	Design and Drawing of Irrigation Structures				B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2001707	Professional Elective (PEC V)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To study the preliminary and secondary investigations required for hydraulic structures.
- To study the different methods for estimating of peak flow.
- To study in detail design procedures and their site-specific criteria.
- To study the different safety measures required for during operations of irrigation structures.

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

CO 1	Gain knowledge and use or apply theory / design principles of surplus weir works.
CO 2	Understand the importance and easily recognize the structure in broadest context of canal drop works.
CO 3	Apply engineering fundamentals in stability and analysis of tower head design.
CO 4	Compute the stresses and stability analysis of canal regulation arrangements.
CO 5	Design of Glacis type of canal drop structures based on different filed conditions.

UNIT-I

Design of surplus Weir: Introduction – Estimation of Flood Discharge – Selection of type of Work – Length of Surplus Weir – Crest Width Base Width – Abutments – Wings Returns – Aprons.

UNIT – II

Canal Drop (Notch Type): Trapezoidal Notch Length of Drop Wall Between Abutments – Profile of Drop Wall – Notch Pier – Protective Works.

UNIT – III

Tank Sluice with Tower Head: Vent Way Design – Sluice Barrel Tower Head – R.C Slab – Earth Pressure – Stability Analysis – Tower Head Design – Cistern.

UNIT – IV

Canal Regulator: Vent Way Design – Drowning Ratio Method – Roadway – Piers Shutters, Abutments – Wing Walls – Return Walls – Return Walls – Solid Apron for Regulator.

UNIT – V

Glacis Type of Canal Drop: Design of throat – Fluming Ratio – Crest Level – Length of weir crest – U/S & D/S side Glacis – Baffle platform – Canal approach – Protective works.

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Text Books:

1. C Satyanarayana Murty "Water Resources Engineering – Principles and Practice", New Age International (P) Limited, Publishers, New Delhi.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

Reference Books:

1. Santosh Kumar Garg "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi.
2. N Balasubramanya "Hydraulic Structures and Irrigation Design Drawing", Sapna Book House and Publishers, Bangalore

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B. Tech., VII Semester

Course Title	Construction Practice and Management					B. Tech., VII Semester		
Course Code	Category	L	T	P	Credits	Maximum Marks		
						Continuous Internal Assessment	End Exam	Total
2001708	Professional Elective (PEC-V)	3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To equip students with the understanding of the importance of construction management, resource management and various stages of construction project
- To give students, the understanding of various concepts involved in construction planning and the ability to schedule the construction activities using various scheduling techniques
- To understand various types of equipment in construction and the effect of mechanization on productivity
- Understand importance and procedure of inspection, Quality control and ethical audit.
- To know the importance of safety measures in construction activity and principles of organization for effective communication

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

CO 1	Understand the importance of construction management, resource management along with various stages of construction project
CO 2	Schedule construction activities using various scheduling techniques
CO 3	Understand various types of equipment in construction and the effect of mechanization on productivity.
CO 4	Inspect the construction activities and perform quality control of various construction activities.
CO 5	Know the importance of safety measures in construction activity and principles of organization for effective communication

UNIT – I

INTRODUCTION: Significance of Construction Management – Objectives and Functions ofConstruction Management – Types of Construction – Resources for Construction Industry – Stages of Construction – Construction Team and Engineering Drawings.

UNIT – II

CONSTRUCTION PLANNING: Work-breakdown structure, methodology of WBS, planning techniques—terminologies used, event and activity, dummy activity, network, precedence, network logic, duration of an activity, forward and backward pass, float or slack time. Path and critical path, bar charts, reparation of network diagram, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), the Line-Of-Balance (LOB), network techniques advantages, disadvantages.

UNIT – III

CONSTRUCTION EQUIPMENT AND MANAGEMENT: Equipment Requirements in

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Construction Industry, Heavy Earth Moving Equipment – Bulldozers, Scrapers, Loaders Shovels and Cranes Compaction Equipment, Grading Equipment, Aggregate Production Equipment, Asphalt Mixing Plant and Asphalt Laying Plant, Hauling Equipment, Concrete Mixing Equipment, Material Handling Devices, Pneumatic Equipment, Bridge Construction Equipment, Drilling and Blasting Equipment, Pumping and Dewatering Equipment.

UNIT – IV

INSPECTION AND QUALITY CONTROL, ETHICAL AUDIT: Need for Inspection and Quality Control

Principles of Inspection – Enforcement of Specifications – Stages of Inspection an Quality Control. Introduction – Aspects of Project Realization – Ethical Audit Procedures – The Decision Makers – Variety of Interest – Formulation of Briefs – The Audit Statement and Reviews.

UNIT – V

SAFETY AND RISK, ORGANIZATION OF CONSTRUCTION: Introduction on Safety and Risk – Concept and Importance of Safety – Types of Risks – Safety and Engineers – Safety Measures in Construction Work – Design for Safety – Risk Benefit Analysis – Accidents. Principles of Organization – Communication – Leadership and Human Relations – Types of Organizations Organization for Construction – Temporary Services and Job Layout.

Text Books:

1. P S Gahlot and B M Dhir "Engineering Construction Planning and Management", NewAge International (P) Limited, Publishers, New Delhi.
2. S C Sharma "Construction Equipment and Its Management", Khanna Publishers, NewDelhi.
3. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Building Construction, 10thEdition, Laxmi Publications (P) Ltd., New Delhi, 2010
4. KN Jha, Construction Project Management,1stEdition, Pearson Publications, New Delhi, 2011

Reference Books:

1. M Govindarajan, S Natarajan and V S Senthilkumar "Engineering Ethics", Prentice-Hallof India (P) Limited, New Delhi.
2. Dr. S Seetharaman "Construction Engineering and Management", Umesh Publications,New Delhi.
3. Horpal Singh "Construction Management and Accounts", Tata McGraw-Hill Companies,Inc. New York.
4. P.K. Joy, Total Project Management: The Indian Context, 1st Edition, Mac Millan Publishers India Limited, 199

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B. Tech., VII Semester

Course Title	Urban Transportation Planning					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2001709	Professional Elective (PEC V)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To study the need of urban transportation planning system.
- To understand different types of transportation surveys.
- To study the process of trip generation and distribution.
- To understand model split and factors affecting it.
- To study the transportation plan preparation for different transit systems

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

CO 1	Justify the need for urban transportation system planning.
CO 2	Undertake transport surveys followed by a report.
CO 3	Plan the process of trip generation and distribution.
CO 4	to understand and evaluate current scenarios of land use
CO 5	Prepare the transportation plans for urban mass rapid transit systems.

UNIT – I

INTRODUCTION TO URBAN TRANSPORTATION SYSTEM PLANNING: Role of transportation in urban development – Transportation problems in urban areas - Purpose of transportation planning - Transportation planning process and factors affecting it - Travel demand and factors affecting it - Urban transport forecasting

UNIT – II

TRANSPORTATION SURVEYS: Study area and zoning - Survey Types: Home interview surveys - Commercial vehicle surveys - Taxi surveys - Road side interview surveys - Post card questionnaire surveys - Registration number surveys - Tag surveys - Public transport surveys - Telephone surveys - Inventory of existing transport facilities.

UNIT – III

TRIP GENERATION AND DISTRIBUTION: Trip generation: Trip purpose, Problems of trip generation -Factors governing trip generation and attraction rates - Trip distribution 3.4 Methods of trip distribution: Uniform factor - Average factor – Detroit – Fratar - Furness and Time factor method - Problems based on trip distribution-Modal Split-Modal split in the transport planning process-Problems-Factors affecting modal split

UNIT – IV

LAND-USE-TRANSPORT MODELS: Introduction-Selection of Land -use-Transport Models-Lowry Derivative Models-Garin-Lowry Model-Applications in India

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UNIT – V

TRANSPORTATION PLAN PREPARATION: Definitions: corridor, corridor traffic forecasting, corridor traffic study, count, segment, point, segment capacity, screen line - Corridor identification - Mass transit system - Urban mass rapid transit system - Rail based transit – Metro, Light rail transit system (LRT), Monorail, Sky rail - Road based transit – Bus rapid transit system (BRTS), Electric trolley bus, commuter Bus / City Bus.

Text Books

1. Kadiyali. L. R. "Traffic Engineering and Transportation Planning", Khanna Publishers, New Delhi.
2. Hutchinson, B. G "Introduction to Urban System Planning", McGraw Hill.
3. Papa Costas C.S.; Fundamentals of Transportation Engineering, Prentice Hall, India
4.

Reference Books

1. John W. Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Pub. Co
2. Vukan R. Vuchic, Urban Public Transportation System & Technology, Prentice Hall, Inc.
3. Jotin Khisty, C. and Kent Lall, B., Transportation Engineering – An Introduction, Prentice- Hall
4. Salter, R J., Highway Traffic Analysis and Design, ELBS.

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B. Tech., VII Semester

Course Title	Solid Waste Management					B. Tech., VII Semester		
Course Code	Category	L	T	P	Credits	Maximum Marks		
						Continuous Internal Assessment	End Exam	Total
20OE104	Open Elective (OEC II)	3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To know the necessity of solid waste management
- To study various strategies for the collection of solid waste
- To understand various solid waste disposal methods
- To understand how to categorize the Hazardous Wastes

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

CO 1	Understand and identify the physical and chemical composition of solid wastes.
CO 2	Understand the optimum route planning for transferring the solid waste.
CO 3	Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid wastes.
CO 4	Understand the design of waste disposal systems.
CO 5	Understand the sources and how to manage the different categories of Hazardous Wastes

UNIT - I

INTRODUCTION TO SOLID WASTE: Definition - Types of solid waste - sources of solid waste - Characteristics - properties of solid wastes - Sampling of Solid wastes - Elements of solid waste management

UNIT - II

SOLID WASTE MANAGEMENT: Solid waste generation - onsite handling - storage and processing - collection of solid wastes - Stationary container system and Hauled container systems - Route planning - transfer and transport.

UNIT - III

RESOURCE AND ENERGY RECOVERY: Processing techniques - materials recovery systems - Composting - types of composting - Problems with composing – Pyrolisis – Gasification - RDF - recovery of energy from conversion products - materials and energy recovery systems.

UNIT - IV

LANDFILLS: Types and Construction of landfills - Design considerations - Life of landfills - Landfill Problems - Lining of landfills - Leachate pollution and control - Landfills

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reclamation.

UNIT - V

HAZARDOUS WASTE MANAGEMENT: Sources and characteristics - Effects on environment - Risk assessment - Disposal of hazardous wastes - Secured landfills, incineration - Biomedical waste disposal - E-waste management

Text Books:

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

Reference Books:

1. CPHEEO Manual on Municipal Solid Waste Management - 2000
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002.
3. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill Inc., New York, 1985.

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B. Tech., VII Semester

Course Title	Estimation and Costing					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE105	Open Elective (OEC II)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To attain basic knowledge on types of quantity estimation of structures different types of structures and estimate quantities of load bearing wall structures
- To interpret the rates of different items of works involved in a construction activity.
- To understand various types & conditions of contracts and related documentation
- To know about various techniques of valuation of land and building properties
- To get basic knowledge on various types of costing along with cost control and reduction techniques.

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

CO 1	Estimate quantities of various types of load bearing wall structures
CO 2	Interpret the rates of different items of works involved in a construction activity.
CO 3	Create different types of contract documents as per requirements of the project
CO 4	Do valuation of land and building properties
CO 5	To fix and estimate the costing of a product using various techniques

UNIT-I

INTRODUCTION TO THE ESTIMATION OF STRUCTURES: Introduction, Different Item of Works – Units of Item of works– Types of Estimates – Methods of Estimates.

QUANTITY ESTIMATION OF BUILDINGS:

Estimation of Quantities in Buildings: Load Bearing Wall Structure of Single Room and Multi Room

UNIT – II

RATE ANALYSIS: Rate Analysis of Different Item of Works: Earthwork Excavation – Mortars of Various Proportions (Cement and Lime)–Concrete with Various Proportions (Lime and Cement) – Brick Masonry – Stone Masonry – Pointing – Painting – Plastering

UNIT – III

CONTRACTS: Types of Contracts, Contract Document, Conditions of Contracts, Contract Procedure, Termination of Contracts, Specifications, Important Conditions of Contract, Arbitration and Tenders.

UNIT – IV

VALUATION: Introduction, Technique of Valuation, Elements of Valuation and Factors Affecting Valuation, Methods of Valuation to the Land Property and Building Property, Mortgage.

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UNIT – V

COSTING: Fixed and variable cost, Product and Process Costing, Standard Costing, Cost estimation, Relevant Cost for decision making, Cost estimation, Cost control and Cost reduction techniques.

Text Books:

2. B N Dutta "Estimating and Costing in Civil Engineering", U B S Publishers Distributers Pvt. Limited, Noida.
3. "Standard Data Book – Vol.2", Andhra Pradesh Department of Standard Specifications, Amaravati.
4. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad
5. G.S. Birdie, Estimating and Costing , Danpatrai Publications, New Delhi, 2009
6. Riggs, J.L ., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996

Reference Books:

3. Dr. Roshan H Namavati "Professional Practice", The Lakhani Book Depot, Mumbai.
4. S C Rangwala "Estimating Costing and Valuation", Charotar Publishing House Pvt. Limited, Anand.
5. IS 1200 (Parts I to XXV–1974/ Method of Measurement of Building and Civil Engineering Works – B.I.S.)
6. M. Chakraborthi, Estimating Costing Specification and Valuation in CivilEngineering,23rd Edition, Laxmi Publications, New Delhi, 2010.

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B. Tech., VII Semester

Course Title	Water Management					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE106	Open Elective (OEC II)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To understand different watershed behavior
- To be able to interpret runoff data and quantify erosion by using various modelling methods.
- To understand land use classification and impact of land use changes on hydrological cycle parameters.

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

CO 1	Identify causes of soil erosion
CO 2	Plan and design soil conservation measures in a watershed
CO 3	Plan and design water harvesting and groundwater recharge structures
CO 4	Plan measures for reclamation of saline soils
CO 5	Understand the soil reclamation and its management

UNIT – I: INTRODUCTION: concept of watershed, need for watershed management, concept of sustainable development. Hydrology of small watersheds.

UNIT – II: SOIL EROSION: Principles of soil erosion- causes of soil erosion, types of soil erosion, estimation of soil erosion from small watersheds, Control of soil erosion, methods of soil conservation – structural and non-structural measures.

UNIT – III: WATER HARVESTING: Principles of water harvesting, methods of rainwater harvesting, design of rainwater harvesting structures.

UNIT – IV: GROUND WATER RECHARGE: Artificial recharge of groundwater in small watersheds-, methods of artificial recharge.

UNIT – V: Reclamation of saline soils -. Micro farming - biomass management on the farm.

TEXT BOOKS:

1. Murthy, V.V.N. and M.K. Jha Land and Water Management, Kalyani Publishers, 2015
2. Watershed Management by Madan Mohan Das and M.D. Saikia, Prentice Hall of India, 2013.
3. Watershed Management Muthy, J. V. S., , New Age International Publishers, 1998.

REFERENCES:

1. Watershed Hydrology by P E Black, Prentice Hall Englewood Cliffs, 1991.
2. Watershed Hydrology by R Suresh, Standard Publishers and Distributors, Delhi, 20

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B. Tech., VII Semester

Course Title	Repair & Rehabilitation of Structures				B. Tech., VII Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
20OE107	Open Elective (OEC III)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To impart knowledge on the distress in structures.
- Understand the basic concepts of deterioration of structures.
- Understand the serviceability and durability aspect of structures.
- Learning the materials used for retrofitting technique.

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

CO 1	Understand the cause of deterioration of concrete structures.
CO 2	Able to assess the damage for different type of structures.
CO 3	Summarize the principles of repair and rehabilitation of structures.
CO 4	Recognize ideal material for different repair and retrofitting technique.
CO 5	Know the artificial polymers and rust eliminators used for retrofitting works.

UNIT – I

INTRODUCTION: Definition for Repair, Retrofitting, Strengthening and rehabilitation. Physical and Chemical Causes of deterioration of concrete structures.

UNIT – II

DAMAGE ASSESSMENT: Purpose of assessment, Rapid assessment, Investigation of damage, Chemical and Physical damages, Evaluation of surface and structural cracks, Damage assessment procedure, destructive, non- destructive, and semi destructive testing systems.

UNIT – III

INFLUENCE OF VARIOUS ELEMENTS ON SERVICEABILITY AND DURABILITY: Effects due to climate, temperature, moisture, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking.

UNIT – IV

MATERIALS FOR REPAIR AND RETROFITTING: Artificial fiber reinforced polymer like CFRP, GFRP,AFRP and natural fiber like Sisal and Jute. Adhesive like, Epoxy Resin, Special concretes andmortars, concrete chemicals, special elements for accelerated strength gain,

UNIT – V

MAINTENANCE AND RETROFITTING TECHNIQUES: Importance of Maintenance.

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Need for retrofitting, retrofitting of structural members i.e., column and beams by Jacketing technique, externally bonding (ERB) technique,

Text Books:

1. Sidney, M. Johnson, "Deterioration, Maintenance and Repair of Structures"
2. Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials, Maintenanceand Repair"- Longman Scientific and Technical.
3. Repair and protection of concrete structures by Noel P.Mailvaganam, CRC Press,1991
4. Concrete repair and maintenance Illustrated by Peter.H.Emmons, Galgotia publicationsPvt. Ltd., 2001.

Reference Books:

1. R. T. Allen and S.C. Edwards, "Repair of Concrete Structures"-Blakie and Sons Raiker R.N., "Learning for failure from Deficiencies in Design, Construction and Service"-R&DCenter (SDCPL).
2. M. S. Shetty, Concrete Technology – Theory and Practice, S. Chand & Co. Ltd., NewDelhi.
3. Failures and repair of concrete structures by S.Champion, John Wiley and Sons, 1961
4. Handbook on seismic retrofit of buildings, A. Chakrabarti et.al., Narosa Publishing House,2010.

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B. Tech., VII Semester

Course Title	Geo-Environmental Engineering					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
						Continuous Internal Assessment	End Exam	Total
20OE108	Open Elective (OEC III)	L	T	P	C	40	60	100
		3	0	0	3			
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To make the students to learn the concepts of geo-environmental engineering, planning and design of waste in landfills, ash ponds and tailing ponds.
- To make the students to understand the effects of pollutants on soil properties
- To give awareness about the adverse effects of soil and ground water contaminants
- To analyze and apply various techniques for remediation of the contaminants
- To make the student to understand the reuse of waste materials in geotechnical constructions.

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

CO 1	Understand the different types of contaminants and their effects on subsurface soils
CO 2	Understand the waste contaminants and design the landfill
CO 3	Understand the environmental impacts due to the contaminants of slurry waste
CO 4	Adopt the type of barriers to protect the earth from different contaminants
CO 5	Understand the engineering properties of the waste material and reuse in the construction

UNIT – I

INTRODUCTION: Industrialization and Urbanization, Pollution, Control, and remediation. **CONTAMINATION:** Surface contamination, Contamination transport, Soil-a Geotechnical trap, Effect of subsurface contamination, Detection of polluted zone

UNIT – II

CONTAMINANTS OF SOLID WASTE IN LANDFILLS: Waste contaminants, landfills, types, shape, and size of landfills. Liner and liner system, Cover and cover system, Stability of landfills.

UNIT – III

CONTAMINANTS OF SLURRY WASTES: Slurry transported wastes, slurry ponds, operation, Embankment construction and raising, Environmental Impact, and control.

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UNIT – IV

VERTICAL BARRIERS FOR CONTAMINANT: Contaminated sites, Types of barriers, Soil-Bentonite slurry trench walls, Cement-Bentonite slurry trench walls and construction material

UNIT – V

GEOTECHNICAL REUSE OF WASTE MATERIALS: Waste reduction, use in geotechnical construction, waste characteristics, transportation consideration, Waste material in Embankment and Fills.

Text Books:

1. Lakshmi N. Reddi and Hilary I. Inyang, "Geoenvironmental Engineering: Principles and Applications", CRC Press, United States.
2. Hari D. Sharma and Krishna R. Reddy, "Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies", John Wiley and Sons, Inc., United States.
3. G.S. Birdie and J. S. Birdie, Water Supply and Sanitary Engineering, 8th Edition, Dhanpat Rai and Sons Publishers, New Delhi, 2010
4. H.S. Peavy and D.R.Rowe, Environmental Engineering, 1st Edition,McGrawHill Publishing Company, New York, 1984.

Reference Books:

1. David E. Daniel, "Geotechnical Practice for Waste Disposal", Chapman & Hall, Springer Publishers, Germany.
2. Rowe R. Kerry, "Geotechnical and Geoenvironmental Engineering Handbook", Springer Publishers, Germany.
3. Proceedings of the International symposium of Environmental Geotechnology (Vol. I and II), Environmental Publishing Company, 1986 and 1989.
4. ASTM Special Technical Publication 874, Hydraulic Barrier in Soil and Rock, 1985.

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B. Tech., VII Semester

Course Title	Environmental Impact Assessment					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		Continuous Internal Assessment	End Exam	Total
20OE109	Open Elective (OEC III)	3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- Deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same.
- The student is able to know about the various impacts of development projects on environment and the mitigating measures.

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

CO 1	Perform a critical quality review of an EIA and EIS.
CO 2	Structure the EIA working process considering the need for interdisciplinary.
CO 3	Perform the screening and scoping of an EIA, based on existing Requirements, evaluate the impacts and draw meaningful conclusions from the results of the EIA.
CO 4	Clarify the concept of EIA and its application in an international context to those involved in or affected by the EIA process.
CO 5	Interpretation an EIA, present its conclusions and translate its conclusions into actions.

UNIT – I

BASIC CONCEPTS OF EIA: Introduction -Initial Environmental Examination – Elements of EIA – Factors Affecting E-I-A – Impact Evaluation and Analysis – Preparation of Environmental Base Map – Classification of Environmental Parameters.

UNIT – II

EIA 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 and Cost/Benefit Analysis.

UNIT – III

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

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UNIT – IV

ASSESSMENT OF IMPACT ON VEGETATION AND WILDLIFE: Introduction – Assessment of Impact of Development Activities on Vegetation and Wildlife.

ENVIRONMENTAL AUDIT: Introduction - Environmental Audit & Environmental Legislation – Objectives of Environmental Audit – Types of Environmental Audit – Audit Protocol – Stages of Environmental Audit – Evaluation of Audit Data and Preparation of Audit Report.

UNIT – V

ENVIRONMENTAL ACTS (PROTECTION AND PREVENTION): Post Audit Activities-The Air, water, Wild Life and Environmental Protection (Prevention Control Acts).

CASE STUDIES: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Highway project, Sewage treatment plant,

Textbooks

1. Y Anjaneyulu and Valli Manickam "Environmental Impact Assessment Methodologies", B S Publications, Sultan Bazar, Hyderabad.
2. J Glynn Henry and Gary W Heinke "Environmental Science and Engineering", Prentice-Hall of India (P) Limited, New Delhi.

Reference Books

1. Dr. Suresh K Dhameja "Environmental Science and Engineering", S K Kataria & Sons Publishers, New Delhi.
2. H S Bhatia "Textbook on Environmental Pollution and Control", Galgotia Publications Pvt. Limited, New Delhi.
3. Rau and Wooten "Environmental Impact Analysis Handbook", Tata McGraw-Hill Companies, Inc. New York.

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B. Tech., VII Semester

Course Title	Industrial Safety Engineering					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE110	Open Elective (OEC-IV)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- The course is intended to give knowledge of various safety management principles, various safety systems, various machine guarding devices, hazard identification techniques, energy sources, systems & applications and the need in the present context. Learners will be able to compare different hazard identification tools and choose the most appropriate based on the nature of industry

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

CO 1	Describe the theories of accident causation and preventive measures of industrial accidents
CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping
CO 3	Explain different issues in construction industries.
CO 4	Describe various hazards associated with different machines and mechanical material handling.
CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards.

UNIT – I

SAFETY INTRODUCTION: Need for safety. Safety and productivity. Definitions: Accident, Injury, Unsafe act, Unsafe Condition, Dangerous Occurrence, Reportable accidents. Theories of accident causation. Safety organization- objectives, types, functions, Role of management, supervisors, workmen, unions, government and voluntary agencies in safety. Safety policy. Safety Officer-responsibilities, authority. Safety committee-need, types, advantages.

UNIT – II

PERSONAL PROTECTION IN WORK ENVIRONMENT: Personal protection in the work environment, Types of PPEs, Personal protective equipment respiratory and non-respiratory equipment. Standards related to PPEs. Monitoring Safety Performance: Frequency rate, severity rate, incidence rate, activity rate. Housekeeping: Responsibility of management and employees. Advantages of good housekeeping. 5 s of housekeeping. Work permit system-objectives, hot work and cold work permits. Typical industrial models and methodology. Entry into confined spaces.

UNIT – III

SAFETY ISSUES IN CONSTRUCTION: Introduction to construction industry and safety issues in construction Safety in various construction operations – Excavation and filling – Under-water works – Under-pinning & Shoring – Ladders & Scaffolds – Tunneling – Blasting

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– Demolition – Confined space – Temporary Structures. Familiarization with relevant Indian Standards and the National Building Code provisions on construction safety. Relevance of ergonomics in construction safety. Ergonomics Hazards - Musculoskeletal Disorders and Cumulative Trauma Disorders.

UNIT – IV

SAFETY HAZARDS IN MACHINES: Machinery safeguard-Point-of-Operation, Principle of machine guarding -types of guards and devices. Safety in turning, and grinding. Welding and Cutting-Safety Precautions of Gas welding and Arc Welding. Material Handling-Classification-safety consideration- manual and mechanical handling. Handling assessments and techniques- lifting, carrying, pulling, pushing, palletizing and stocking. Material Handling equipment-operation & maintenance. Maintenance of common elements-wire rope, chains slings, hooks, clamps. Hearing Conservation Program in Production industries.

UNIT – V

HAZARD AND RISK: Types of hazards –Classification of Fire, Types of Fire extinguishers, fire explosion and toxic gas release, Structure of hazard identification and risk assessment.

Text Books:

1. R.K Jain (2000) Industrial Safety, Health and Environment management systems, Khanna Publications.
2. Paul S V (2000), Safety management System and Documentation training Programme handbook, CBS Publication.
3. Krishnan, N.V. (1997). Safety management in Industry. Jaico Publishing House, New Delhi.
4. John V. Grimaldi and Rollin H.Simonds. (1989) Safety management. All IndiaTraveller Book Seller, Delhi

Reference Books:

5. Ronald P. Blake. (1973). Industrial safety. Prentice Hall, NewDelhi.
6. Alan Waring. (1996). Safety management system. Chapman & Hall, England.
7. Vaid, K.N., (1988). Construction safety management. National Institute of Construction Management and Research, Mumbai.
8. AIChE/CCPS. (1992). Guidelines for Hazard Evaluation Procedures. (second edition). Centre for Chemical Process Safety, American Institute of Chemical Engineers, New York.

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B. Tech., VII Semester

Course Title	Surveying					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE111	Open Elective (OEC IV)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3		0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- Be familiar with Chain and Compass in measuring the horizontal and vertical distances, calculating simple areas, and correcting different errors.
- Identify the level instruments; record the levels in field book and determine the reduced levels of objects by different methods.
- Determine the areas and volumes on the field by different rules and methods.
- Using totalstation instrument for measuring the distances, angles, and areas.
- Understand the concepts of photogrammetry and remote sensing which can be used in higher surveying.

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

CO 1	Use the chain and compass for preliminary survey
CO 2	Determine the different levels and computing the areas and volumes for various civil engineering works
CO 3	Determination distances and angles using trigonometric concepts
CO 4	Use of total station instrument for different field applications
CO 5	Know the concepts of Photogrammetry and Remote sensing

UNIT-I

INTRODUCTION TO SURVEYING: Definition; Classification; Principles of surveying; Errors in surveying: Types of errors; Ranging, Principles of chain surveying; Basic definitions.

COMPASS SURVEYING: Prismatic compass, Surveyor's compass, Whole Circle and Quadrant Bearing, Included angles, and errors.

UNIT – II

LEVELLING: Different methods of levelling, Different types of level instruments, Levelling staff, Level field book, Reciprocal Levelling, Evaluation of Reduced Levels byRise and Fall Method, and Height of Instrument Method

Areas: Introduction; Simpson's rule; Boundaries with offsets at irregular intervals; coordinate method; level section; two level section; trapezoidal and prismoid rule

UNIT – III

MODERN FIELD SURVEY SYSTEMS: Principle of Electronic Distance measurement; types of EDM instruments, total station, parts, accessories – advantages and applications, field procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments.

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UNIT – IV

PHOTOGRAMMETRIC SURVEYING: Introduction, Basic concepts, perspective geometry of aerial photograph, relief, and tilt displacements, and terrestrial photogrammetric

UNIT – V

REMOTE SENSING: Definition, Energy Principles, radiation principles, principles, and Use of EMR spectrum, Energy interactions in atmosphere- Scattering, Absorption, Energy interactions with h surface features and concepts of spectral reflectance curve.

Text Books:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying – Vol. I, II and III, Laxmi Publications (P) Ltd., 17th Edition, 2016.
2. R. Subramanian, Surveying and Levelling, Oxford University Press, 2nd Edition, 2012.
3. Chandra, A.M, Plane Surveying, 2nd Edition, New Age International Publishers, NewDelhi, 2010.
4. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi.

Reference Books:

1. S. K. Duggal, Surveying – Vol. I and II, Tata McGraw–Hill Publishing Co. Ltd., 4th Edition,2013.
2. Arthur R. Benton and Philip J. Taetz, Elements of Plane Surveying, McGraw-Hill, 3rdEdition,2010.
3. Arora, K. R., Surveying – Vol. I and II, Standard Book House, 14th Edition, 2011.
4. T. P. Kanetkar and S. V. Kulkarrni, Surveying and Levelling, Pune Vidyarthi Griha Prakashan, Pune, 24th Edition, 2013.

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B. Tech., VII Semester

Course Title	Traffic Engineering					B. Tech., VII Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE112	Open Elective (OEC IV)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

The objective of this course is to impart knowledge about various components and characteristics of traffic to understand concepts like Highway capacity and level of service concepts. To know various traffic control devices and principles of highway safety.

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

CO 1	Conduct different engineering surveys required for highway planning and design
CO 2	Analyze the traffic flow patterns and delay patterns
CO 3	Understand the role and importance of various traffic control devices
CO 4	Know the impact of traffic on environmental pollution and standard pollution limits
CO 5	Understand the concepts of level of service of highways along with various highway systems required for traffic surveillance

UNIT – I

COMPONENTS OF THE TRAFFIC SYSTEM: Human-Vehicle–Environment System; characteristics of Road users, Vehicles, Highways and their classification; Traffic Studies: Inventories; Volume studies; Speed, Accident studies.

UNIT – II

TRAFFIC CHARACTERISTICS: Microscopic and macroscopic flow characteristics: Time headways; Temporal, spatial and model flow patterns; Interrupted and Un interrupted traffic. Travel time and delay studies, Car-following theories.

UNIT – III

TRAFFIC CONTROL DEVICES & HIGHWAY SAFETY: Traffic signs & Markings; Signal Warrants; Signal phasing and Development of phase plans; Fixed and Vehicle activated signals; Accident characteristics – Road – Driver – Vehicle; Accident recording and Analysis; Highway Safety Improvement Program; Safety Audit.

UNIT – IV

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

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UNIT – V

HIGHWAY CAPACITY AND LEVEL OF SERVICE: Capacity and level of service; Factors affecting Capacity and LOS; Capacity of Rural Highways, Capacity of Urban Roads;
Highway Systems: Traffic surveillance and monitoring; Intelligent vehicle highway system. IVHS programs, Role of IVHS, IVHS categories, Benefits and Costs of IVHS.

Text Books:

1. L R Kadiyali "Principles and Practice of Highway Engineering", Khanna Publishers, New Delhi.

2. S K Khanna, C E G Justo and A Veeraragavan "Highway Engineering", Nemchand Publications, New Delhi.

3. Papacoastas, C. S. and Prevedouros, Transportation Engineering and Planning, Third Edition, Third Impression; Pearson Education, 2018.

4. Highway Engineering, Paul H. Wright and Karen K Dixon, Wiley Student Edition, Wiley India (P) Ltd., New Delhi

Reference Books:

1. G V Rao "Principles of Transportation and Highway Engineering", Tata McGraw-Hill Companies, Inc. NewYork.
2. Partha Chakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice Hall of India, New Delhi.
3. S P Bindra "Highway Engineering", Dhanpath Rai & Sons, New Delhi.
4. Traffic & Highway Engineering by Nicholas J. Garber, Lester A. Hoel, Fifth Edition, published in 2015, CENGAGE Learning, New Delhi.

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B. Tech., VII Semester

Course Title	Practices in Geo-Technical Engineering					B. Tech., VII Semester		
Course Code	Category	L	T	P	Credits	Maximum Marks		
						Continuous Internal Assessment	End Exam	Total
20015S5	Skill Oriented Course (SOC V)	1	0	2	2	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To introduce traditional program consisting mostly of practical courses related to geotechnical engineering.
- To apply the knowledge of science, mathematics and engineering with the context of applications in geotechnical engineering.
- To design and conduct experiments, analyze and interpret data related to the various laboratory tests studied in geotechnical engineering.
- To classify the soils based on the field identification (coarse and fine)
- To estimate the bearing capacity and design the various types of foundations

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

CO 1	An ability to identify, formulate and practice the various soil identification and classification tests
CO 2	An ability to identify the sample and samplers and suitable boring methods to collect the soils
CO 3	An ability to use the modern equipment to find the shear and settlement properties of the soils
CO 4	An ability to select, formulate or enhance the testing facilitates to cater the requirement of selection of proper soil type as per the requirement
CO 5	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Unit – I Field Identification of Soils

Identifying soils for various types of constructions, Preparation of Report

Unit – II Soil Sample Collection Methods

Types of samples and samplers - Types of Augers, Boring methods

Unit – III Advanced Testing Methods

Field CBR Method, Triaxial Shear Test (Digitized), Consolidation Test (Digitized)

Unit – IV Penetration Methods

Standard Penetration Test, Cone Penetration Test

Unit – V Designs of SBC and types of foundations using software tools

Bearing capacity by Terzaghi, Mayerhoff, Vesic methods – Design of footings for multistory structure, silos, transmission tower, and machines.

Text Books:

1. S Mittal and J P Shukla "Soil Testing for Engineers", Khanna Publishers, New Delhi.

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2. T G Sitharam and T N Ramamurthy "Geotechnical Engineering", S Chand Publishing, New Delhi
3. Analysis and Design of Foundation - J. E. Bowles
4. Engineering Properties of Soil and Their Measurements- Bowles J.E. (1988), - McGraw Hill Book Co. New York

Reference Books:

1. Foundation Engineering - M.J. Tomlinson
2. Analysis and Design of Substructures - Swami Saran
3. Foundation Design – Coduto
4. SP 36 Compendium of Soil Mechanics (Part – 1 & 2)
5. IS: 2911 (All Parts)

Software:

1. ABC
2. Plaxis
3. Apile
4. GeoStudio
5. Staad Foundation
6. MS Office (Excel)

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