### VII SEMESTER

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Credits</th>
<th>Hours Per Week</th>
<th>Lecture</th>
<th>Tutorial</th>
<th>Practical</th>
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<tbody>
<tr>
<td>1</td>
<td>UCV701C</td>
<td>Design of steel structures</td>
<td>04</td>
<td>04</td>
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<tr>
<td>2</td>
<td>UCV713C</td>
<td>Estimation, Valuation and Work Contracts</td>
<td>04</td>
<td>04</td>
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<td>3</td>
<td>UCV704C</td>
<td>Design of PSC Structures</td>
<td>04</td>
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<td>4</td>
<td>UCV705C</td>
<td>Design of Irrigation Structures</td>
<td>03</td>
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<td>00</td>
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<td>5</td>
<td>UCV7XXE</td>
<td>Elective – III</td>
<td>04</td>
<td>03</td>
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<td>6</td>
<td>UCV701P</td>
<td>Extensive Survey Project</td>
<td>04</td>
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<td>7</td>
<td>UCV702P</td>
<td>Project Phase – I</td>
<td>03</td>
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### ELECTIVES -3

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>UCV722E</td>
<td>Traffic Engineering</td>
<td>04</td>
</tr>
<tr>
<td>02</td>
<td>UCV727E</td>
<td>Rural water supply &amp; sanitation</td>
<td>04</td>
</tr>
<tr>
<td>01</td>
<td>UCV 724E</td>
<td>Pavement Design</td>
<td>04</td>
</tr>
<tr>
<td>04</td>
<td>UCV725E</td>
<td>Design and Drawing of Steel Structures</td>
<td>04</td>
</tr>
<tr>
<td>05</td>
<td>UCV 726E</td>
<td>Solid Waste Management &amp; sanitation</td>
<td>04</td>
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</table>
### VIII SEMESTER

#### ELECTIVES - 4

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject Code</th>
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<td>Lecture</td>
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<tr>
<td>1</td>
<td>UCV827E</td>
<td>Advance Foundation Design</td>
<td>04</td>
<td>04</td>
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<tr>
<td>2</td>
<td>UCV828E</td>
<td>Advanced Design of RC Structures</td>
<td>04</td>
<td>03</td>
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<tr>
<td>3</td>
<td>UCV 835E</td>
<td>Pavement Design</td>
<td>04</td>
<td>03</td>
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<tr>
<td>4</td>
<td>UCV836E</td>
<td>Advanced Concrete Technology</td>
<td>04</td>
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<tr>
<td></td>
<td>UCV837E</td>
<td>Industrial Wastewater Treatment</td>
<td>04</td>
<td>--</td>
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<tr>
<td></td>
<td>UCV834E</td>
<td>Theory of Elasticity</td>
<td>04</td>
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#### TOTAL

|         |              |                                  | 25      | 10      | 00       | 00        |

#### ELECTIVES - 5

<table>
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<tr>
<td>01</td>
<td>UCV841E</td>
<td>Design of Masonry Structures</td>
<td>04</td>
</tr>
<tr>
<td>02</td>
<td>UCV 842E</td>
<td>Environmental Impact Assessment</td>
<td>04</td>
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<tr>
<td>03</td>
<td>UCV843E</td>
<td>Open Channel Hydraulics</td>
<td>04</td>
</tr>
<tr>
<td>04</td>
<td>UCV844E</td>
<td>Numerical techniques in Civil Engineering</td>
<td>04</td>
</tr>
<tr>
<td>05</td>
<td>UCV845E</td>
<td>Structural Dynamics</td>
<td>04</td>
</tr>
<tr>
<td>06</td>
<td>UCV846E</td>
<td>Finite Element Methods</td>
<td>04</td>
</tr>
</tbody>
</table>
UNIT I

Introduction: Advantages & Disadvantages of steel structures, Loads & Load combinations, Design considerations, Limit State method of design, Failure criteria for steel, codes, specifications and section classification. 6 Hrs

Bolted Connections: Introduction, Behavior of bolted joints, design strength of ordinary black bolts, design of HSFG bolts, simple connections, moment resistant connections, beam to beam connections. 6 Hrs

UNIT II

Welded Connections: Introduction, welding process, advantages of welding, types and properties of welds, types of joints, weld symbols, weld specifications, effective area of welds, design of welds, simple joints, moment resistant connections, continuous beam to beam connections. 6 Hrs

Plastic behavior of structural steel: Introduction, Plastic theory, plastic hinge concept, plastic collapse load, condition of plastic analysis, theorem of plastic collapse, methods of plastic analysis, plastic analysis of continuous beam. 7 Hrs

UNIT III

Design of Tension members: Introduction, Types of tension members, Behavior of tension member, factors affecting the strength of tension member, design of tension member, Axially loaded tension members and their connections, Design of Lug angles, Design of truss ties and joints. 6 Hrs

Design of Compression members: Introduction, failure modes, Behavior of compression member, sections used for compression members, effective length, design of compression members, Columns including built up sections Laced and Battened systems, Column splicing. 8 Hrs

UNIT IV

Design of Column Bases: Design of slab base and gusted base. 6 Hrs

Design of Beams: Introduction, beam types, factors affecting lateral stability of beams, behavior of simple and built up beams in bending(with out vertical stiffeners), design strength of laterally supported beams in bending, maximum deflection, design of beams and purlins. 7 Hrs

Text Books

N. Subramanian "Design of Steel Structures", Oxford Publications, 2008 Reference Book
3. Punmia, B. C    "Comprehensive Design of Steel Structures", Laxmi Publications
4. Karve - "Design of Steel Structures" (Limit State Method), Structures Publications, Pune

**Code Books**

IS-800-2007, Steel tables (to be supplied in examinations)

**Examination Pattern**

Student has to attempt any **FIVE** full questions, selecting at least **ONE** from each unit.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Objectives</th>
<th>Course Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>In this students are exposed to the different methods of the designs of different structural components and to teach the students Difference between working state and limit state method, bolted and welded connections.</td>
<td>After studying the course, the student will acquire the knowledge of Difference b/n LSD and WSD. Bolted connections for steel members. Welded connections for steel members.</td>
</tr>
<tr>
<td>2.</td>
<td>Plastic behavior. And also to know the design of tension, compression members. To acquaints design of beams and column bases.</td>
<td>Plastic analysis for steel members. D/n of tension and compression members. D/n of beams and column bases.</td>
</tr>
</tbody>
</table>
UNIT I
ESTIMATE: Different types of estimates, study of various drawing attached with estimates. Important terms, units of measurement, abstract, approximate methods of estimating building, cost from materials and labour equations recommended by CBRI examples. 6Hrs

ESTIMATION: Methods of taking out quantities and cost center line method, long and short wall method. Preparation of detailed and abstract estimates for the following Civil Engineering works: Buildings Masonry structures and framed structures, structures with flat, sloped RCC roofs, Building components (Beams, Columns and Column Footings, RCC Roof Slabs). 7Hrs

UNIT II
ESTIMATES: Steel truss (Fink and Howe truss), RCC Slab culverts, manhole and septic tanks. 6Hrs
SPECIFICATIONS: Definition of specifications, objective of writing specifications, essentials in specifications, general and details specifications of items. 7Hrs

UNIT III
RATE ANALYSIS: Definition and purpose. Working out quantities and rates for the following standard items of works: earth work in different types of soils, cement concrete of different mixes, bricks and stone masonry, flooring, plastering, RCC works, centering and form work for different RCC items, wood and steel works for doors, windows and ventilators. 7Hrs

MEASUREMENT OF EARTHWORK FOR ROADS: Methods for computation of earthwork cross sections mid section formula, trapezoidal or average end area or mean sectional area formula, prismoidal formula for different terrains. 6Hrs

UNIT IV
CONTRACTS: Types of contracts essentials of contract agreement legal aspects, penal provisions on breach of contract. Definition of the terms tender, earnest money deposit, security deposit, tender forms, tender documents and types. 6Hrs

DEPARTMENTAL PROCEDURES: comparative statements, acceptance of contract document and issue of work orders. Duties and liabilities, termination of contract, completion certificate, quality control, rights of contractor, refund of deposit. Administrative approval Technical sanction, Nominal Muster roll, Measurement Books procedure for recording and checking measurements preparation of bills of works in buildings, specifications of items of works in building, specifications of aluminum and wooden partitions, false ceiling, aluminum and fibre doors and window, various types of claddings. 7Hrs

Text Books:

Reference books:

SEE - Question paper pattern-Question paper consists 7 of questions carrying 20 marks each and students should answer.
Unit-A compulsory and any three question selecting at least one question from remaining three units.

<table>
<thead>
<tr>
<th>Sl. No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The students should be able to understand different types of estimates approximate methods of estimates, empirical formulae for estimation of buildings (CBRI equations).</td>
<td>The students at the end of the course will be capable of understanding different methods of estimate, CBRI formulae for the building estimate.</td>
</tr>
<tr>
<td>2.</td>
<td>The students should be capable of finding out quantity of different items of structures by long wall/ short wall and central line methods.</td>
<td>Estimating cost of load bearing / framed structures by long wall/ short wall and central line methods.</td>
</tr>
<tr>
<td>3.</td>
<td>Load bearing / framed buildings, culverts bridges. The students should be capable of understanding general / detailed specifications of the different items. Also he/she should be able know the specification if advanced. Materials like aluminum fiber doors and windows.</td>
<td>Estimating cost of the truss, culverts and septic tanks. Detailed specifications of the different items of civil works.</td>
</tr>
<tr>
<td>4.</td>
<td>The students should be capable carrying rate analysis for the different items of building/ structure, labor charges and local materials rates.</td>
<td>Finding the item rates of the different items of civil works. Working the earth work for the roads by different methods.</td>
</tr>
<tr>
<td>5.</td>
<td>The students should be capable calculating quantity of earth work for the roads using different methods of understanding PWD procedures for executing the civil works.</td>
<td>Carrying out the civil works as per PWD forms.</td>
</tr>
</tbody>
</table>
UCV 704C: DESIGN OF PRE-STRESSED CONCRETE STRUCTURE
CREDIT 04 (4-0-0)

UNIT-I
Materials: High strength concrete and steel, stress-strain characteristics and properties 6Hrs

Basic Principles of Prestressing: Fundamentals, Load balancing concept, stress concept, centre of thrust, pre-tensioning and post-tensioning systems, tensioning methods and end anchorages. 7Hrs

UNIT-II
Analysis of sections for flexure: Stresses in concrete due to prestress and loads, stresses in steel due to loads, cable profile. 7Hrs
Losses of prestress: Various losses encountered in pretensioning and post tensioning methods, determination of jacking force. 6Hrs

UNIT-III
Deflections: Prediction of short term and long term deflections of un cracked members. 6Hrs

Limit State of collapse and serviceability: I.S. code recommendations-ultimate flexural and shear resistance of sections, shear reinforcement, Limit state of serviceability-control of deflections and cracking. 7Hrs

UNIT-IV
Design of End blocks: Transmission of Prestressing pre-tensioned members, transmission length, anchorage stress in post-tensioned members, bearing stress and bearing tensile stress in end block, Methods, I.S. code provision for the design of end block reinforcement. 7Hrs

Design of Beams: Design of pretensioned and post-tensioned d symmetrical and asymmetrical permissible stress, design of Prestressing force and eccentricity, cable profile, limiting zone of Pre stressing force. 6Hrs

REFERENCE BOOKS:
N. Krishna Raju "Prestressed Concrete" P. Dayaratnam Prestressed Concrete Rajgopalan Prestressed Concrete E.G- Navy Prestressed Concrete.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Objectives</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>To know the basic principles of pre-stressing.</td>
<td>On successful completion student will be able to understand principle of pre-stressing.</td>
</tr>
<tr>
<td>2.</td>
<td>To know the different systems and types of pre-stressing.</td>
<td>Analyze section for flexure shear Strength.</td>
</tr>
<tr>
<td>3.</td>
<td>To understand the analysis of pre-stressed concrete sections.</td>
<td>Find out deflections of PCS.</td>
</tr>
<tr>
<td>4.</td>
<td>To know the flexural and shear strength of pre-stressed concrete.</td>
<td>To design pre-stressed concrete sections.</td>
</tr>
</tbody>
</table>
UNIT-I

Introduction: Necessity for sanitation, Sewerage systems and their suitability. 02 Hours

Estimation of Wastewater flows: Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of sewage and storm discharge, rational method and empirical formulae of design of storm water drain. Time of concentration. 04 Hours

Design of Sewers: Hydraulic formulae for velocity, effects of flow variations on velocity, self cleansing and non scouring velocities. Design of hydraulic elements for circular sewers flowing full and flowing partially full (No derivations.) laying of sewers, joints and testing of sewers, ventilation and cleaning of sewers. 04 Hours

UNIT-II

Sewer Appurtenances: Catch basin, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage. Typical layout plan showing house drainage connections, maintenance of house drainage 04 Hours

Sewage Characteristics: Sampling, significance, techniques and frequency. Physical, Chemical and Biological characteristics, with emphasis on BOD & COD, Aerobic and Anaerobic activity, CNS cycles. Their significance problems. 05 Hours

UNIT-III


Treatment of Wastewater: Flow diagram of municipal wastewater treatment plant. Preliminary & Primary treatment Screening, grit chambers, skimming tanks, primary sedimentation tanks- Design criteria & simple Design examples. 05 Hours

UNIT-IV

Secondary Treatments: Suspended growth and fixed film bioprocess. Trickling filter theory and operation, types and designs. Activated sludge process- Modifications Theory, Operation and design. 05 Hours

Anaerobic Sludge digestion, Sludge digestion tanks, Design of Sludge drying beds. Low cost waste treatment method. Desgn of Septic tank, Oxidation Pond and Oxidation ditches. 05 Hours

Textbooks:
3. Environmental Engineering by modi

Reference Books:

Scheme of Examination: Student has to answer any five full questions out eight, selecting at least one question from each section.
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th><strong>Course Objectives</strong></th>
<th><strong>Course Outcomes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>To impart the basic knowledge about the necessity for sanitation and sewerage system. Students are exposed to computational methods of Sewage and Storm discharge.</td>
<td>Students will learn about the Necessity for sanitation and sewerage system. Students can compute methods of Sewage and Storm discharge.</td>
</tr>
<tr>
<td>2.</td>
<td>To make the students learn about design of hydraulic elements of Sewers and laying of sewers, testing, ventilating and cleaning of sewers.</td>
<td>Design of hydraulic elements of Sewers and laying of sewers, testing, ventilating and cleaning of sewers.</td>
</tr>
<tr>
<td>3.</td>
<td>To provide the information about sewer appurtenances and typical layout plan of house drainage connections to the students.</td>
<td>Sewer appurtenances and typical layout plan of house drainage connections.</td>
</tr>
<tr>
<td>4.</td>
<td>Students will be exposed to the sampling techniques/physico-chemical and biological characteristics with their significance.</td>
<td>Sampling techniques/physico-chemical and biological characteristics with their significance.</td>
</tr>
<tr>
<td>5.</td>
<td>To make the students understand about the disposal of effluents on land and in water. Students will be exposed to various types of primary wastewater treatment processes.</td>
<td>Disposal of effluents on land and in water. Students learn about various types of primary wastewater treatment processes.</td>
</tr>
<tr>
<td>6.</td>
<td>To make the students familiar with secondary treatment processes like trickling filter, and activated sludge process.</td>
<td>Secondary treatment processes like trickling filter, and activated sludge process.</td>
</tr>
<tr>
<td>7.</td>
<td>Students will be exposed anaerobic sludge digestion, low cost wastewater treatment methods, design of septic tank, oxidation pond and oxidation ditches.</td>
<td>Anaerobic sludge digestion, low cost wastewater treatment methods, design of septic tank, oxidation pond and oxidation ditches.</td>
</tr>
</tbody>
</table>
UNIT-II

Introduction: Definition-Objective Scope of Traffic Engineering
Road User and Vehicle Characteristics: - Static and Dynamic characteristics- Power performance of vehicles- Resistances to the motion of vehicles- Reaction time of driver- Problems of above.

Traffic Flow Theories: Traffic flow theory Green shield theory Goodness of fit correlation and regression analysis (linear only)- Queuing theory Car following theory Relevant Problems on above.

UNIT-II

Traffic Parameter Studies and Analysis: Objectives and Method of study Definition of study area- Sample size- Data Collection and Analysis- Interpretation of following Traffic Studies- Volume, Spot Speed, Origin and Destination. Speed and Delay- Parking-on Street and off Street Parking- Accidents- Causes, Analysis (right angle collision only with parked vehicle) Measures to reduce Accident. Problems.

UNIT-III

Probability Distribution: Poisson's Distribution and application to Traffic Engineering Normal Distribution- Significance tests for observed Traffic Data Chi- Square test Problems on above - Sample size- traffic forecast simulation technique.

UNIT-IV


TEXTBOOKS:
1. Khanna and Justo., "Highway Engineering" Nemchand Bros
2. L.R. Kadiyali., " Traffic Engineering and Transport Plankling". Khann Publisher.

REFERENCE BOOKS:
1. Pignataro.," Traffic Engineering", Prentice Hall
3. An Introduction to Transportation Engineering, Jotin Khistey and Kent Lall, PHI.
4. Traffic Engineering-Mc Shane and Roess, PHI

Scheme of Examination: Student has to answer five questions selecting at least one question from each part out of eight.
UCV727E: RURAL WATER SUPPLY AND SANITATION

Credits 03 (3-0-0)

UNIT-I

INTRODUCTION: Need for a protected water supply, investigation and selection of water borne diseases, protection of water sources, drinking water quality standards. Types of pumps, supply systems: BWS, MWS, PWS, Water treatment methods- Disinfection, defluoridation, hardness & iron removal, Ground water contamination and control. 10 hrs

UNIT-II

RURAL SANITATION: Conservancy system , public latrine, Night soil-Collection and disposal, trenching and Composting Methods. Two pit latrines, Aqua privy, W.C. Septic tank and soak pit. 10 hrs

UNIT-III

DRAINAGE SYSTEMS: Strom water and sullage disposal, rain water harvesting and uses.

COMMUNICABLE DISEASES: Terminology, classification, methods of communication of diseases, general methods of control.

REFUSE COLLECTION AND DISPOSAL: Garbage, ash, rubbish, collection methods, transportation, disposal- salvaging, dumping, controlled tipping, incineration, composting, dung disposal- digester, biogas plant. 10 hrs

UNIT-IV

MILK SANITATION: Essentials, test for milk quality, pasteurisation, quality control, cattle borne diseases, planning for a cow shed.

INSECT CONTROL: House fly and mosquito- life cycle, disease transmission and control measures. 10 hrs

Text Books

1. Environmental Sanitation By Salvato.
1. Preventive And Social Medicine By Park And Park.

Scheme of Examination: Student has to answer five questions out of eight, selecting at least one question from each unit.
UCV728E: DESIGN OF IRRIGATION STRUCTURES

Credits 03 (3-0-0)

UNIT-I

Canals: Introduction, Classification, cross section of irrigation canal and fixing L-section and design considerations 4hrs

Cross Drainage works: Introduction, Types of CD works. Design considerations for CD work Fluming of canal: Mitra’s hyperbolic, chaturvedis’s formula. Design of aqueduct and super passage only. Hydraulic design of protection work. 7hrs

UNIT-II

Gravity Dam-I Introduction, causes of failure : Design principles stability analysis by analytical methods. 7hrs

Gravity Dam II: Joints in GD keys and water stops. Temperature control in GD. Drainage galleries in GD, Foundation grouting, Construction of GD. Introduction for GD. 4hrs

UNIT-III

Earth Dam: Introduction, Causes of failure of ED Preliminary section of an ED. Determination of phreatic line by cassagrande’s method and analytical method. Stability of slope by sliding wedge method (without earthquake force). 6hrs

Spillways: Introduction, Components of spillway, Ogee shaped spillway. Discharge computation for an ogee spillway. D/S profile, and U/S profile of the crest of an ogee spillway. 4hrs

UNIT-IV

Canal Fall: Introduction, Types of falls. Design of trapezoidal notch type fall and Sarda type fall. 6hrs

Canal Regulation works: Introduction, Function of a regulator Design of cross regulator and head regulator, Introduction to sediment control. 4hrs

Text Book:

Reference Book:
1) Irrigation Engg. & Hydraulic Structures-Sahasra Budde- Dhanapath Rai Publication New Delhi
2) Irrigation and water Power Engg. B.C.Punmia & Pande lal Laxmi publication New Delhi
An extensive survey training involving investigation and design of the following projects is to be conducted for 10 days. The students shall submit a project report consisting of designs and drawings

1. General instructions, Reconnaissance of the sites and fly leveling to establish bench marks.
2. NEW TANK PROJECT: The work shall consist of:
   i) Alignment of center line of the proposed bund, Longitudinal and cross sections of the center line.
   ii) Capacity surveys.
   iii) Details at Waste weir and sluice points.
   iv) Canal alignment.

3. RESTORATION OF AN EXISTING TANK: The work shall consist of: i) Survey of center line of the existing bund. Longitudinal and cross-sections along the center line, ii) Capacity surveys, Details at sluice and waste weir.

4. WATER SUPPLY AND SANITARY PROJECT: Examination of sources of water supply, Calculation of quantity of required based on existing and projected population. Preparation of map by Total Station Survey, location of sites for ground level and overhead tanks, detailed surveys for laying the sewers and design of sewers

5. HIGHWAY PROJECT: Preliminary and detailed investigations to align a new road (Min 2 km) between two obligatory points. The investigations shall consist of topographic surveying for alternate routes and for final alignment. Report should justify the selected alignment with details of all geometric designs for traffic and design speed assumed. Drawings shall include key plan, initial alignment, finial alignment, longitudinal/cross section along final alignment. Typical cross sections of road.

Extensive Survey Project Assessment.
1) CIE 50Marks
2) SEE50Marks

Evaluation procedure for CIE
Student shall perform the following
- Field work - 12.5M
- Office work (Design and drawing) - 12.5M
- Presentation of the prepared report - 12.5M
- Final report Submission - 12.5M

Evaluation procedure for SSE
Allocation of 50 marks for SEE (Exam duration 3 hrs)
* 37.50 marks for presentation of the project work And 12.50 marks Viva-Voce.
UCV702P PROJECT PHASE-I

4 Credits

Project Work Phase I

1) CIE 50 Marks
   CIE Marks to be awarded by Project Guide
2) SEE 50 Marks: Department Committee (DC) will conduct the examination

DC Members
1) HOD or his Nominee
2) Guide
3) Project Co-ordinator
UNIT-I

Construction industry and Management: Introduction, Value engineering, time management, Labour and material management, Contract and contractor, organization and administration, financial management.  

Introduction to Engineering Economics: Basic concepts of economics analysis, Micro and Macro analysis, project feasibility, economic and financial feasibility, benefit cost ratio, interest formulae, present worth, future worth, annual equivalent, basis for comparison of alternatives, rate of return method, break even analysis, planning methods, problems on above.

UNIT-II

Construction planning: Introduction, time estimates, planning methods of projects, Bar and Milestone charts, PERT and CPM network analysis, project feasibility. Cost Model, Direct cost, indirect cost, total cost, optimum cost, optimum duration of project problems, Line of balance technique, resource allocation and updating.

UNIT-III

Construction equipments: Introduction, various earth moving equipments, hoisting equipments, concrete mixer and plants, conveyors and rollers, trenching machines, equipments for Highway construction, factors for selecting equipment out, special equipment, Standard equipment, economic life.

UNIT-IV

Work Study in Construction, safety measures bidding

UCV825E: DESIGN AND DRAWING OF STEEL STRUCTURES  
CREDIT 04 (2-0-4)  

UNIT-A  
(DRAWINGS TO BE PREPARED FOR GIVEN STRUCTURAL DETAILS)  

CONNECTIONS: Bolted and welded, beam-beam, Beam-column, seated, stiffened and un-stiffened.  

COLUMNS: Splices, Column-column of same and different sections. Lacing and battens.  

COLUMNBASES: Slab base and gussetedbase.13 (T)+18D)  

UNIT-B  

Design and drawing of  
i) Bolted and welded plate girder  
ii) Roof Truss (Forces in the members to be given)  
iii) Gantry girder 13(T) + 21 (D)  

Reference Books:  
1. Design of Steel Structures Ramchandra- Standard Book House, 1705-A, Nai Sarak, Delhi-6  
2. Design of Steel Structures Dayarathnam P A.H. Wheeler & Co. Ltd.  
3. DesignofSteelStructures Negi-TataMcGrawHillPublishers  
4. Design of Steel Structures Arya and Ajaman Nem Chand & Bros. Roorkee  
5. Design of Steel Structures- Raghupati  
6. IS:800-2007 orSteeltable  
7. Detailing of Structures- Dayarathnam P  
8. Design of Steel Structures- N. Subramanian: Oxford University, Press.
UNIT-I
INTRODUCTION: Solid waste - Definition, Land Pollution scope and importance of solid waste management, functional elements of solid waste management.

CLASSIFICATION & SOURCES: Waste Quality Characteristics
municipal, hospital waste Generation rate. 12 hrs

UNIT-II
COLLECTION AND TRANSPORTATION: Systems of collection, Collection equipment, garbage chutes, transfer stations - bailing and compacting and route optimization.

TREATMENT / PROCESSING TECHNIQUES: Components separation, volume reduction, size reduction, chemical reduction and biological processing.

INCINERATION: Processes - 3 T's factors affecting incineration process, incinerators - types, prevention of air pollution, pyrolisis. 14 hrs

UNIT-III
COMPOSTING: Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermi composting

SANITARY LAND FILLING: Definition, Trench area method , Ramp and pit method, Site selection: Basic steps involved, cell design, prevention of site pollution, leachate collection and control methods, gas collection systems. 12 hrs

UNIT-IV
DISPOSAL METHODS: Open dumping - selection of site, ocean Disposal, feeding to hogs, incineration, pyrolisis, composting, sanitary land filling, merits and demerits.

RECYCLE AND REUSE: Material and energy recovery operations, reuse in other industries, plastic wastes, Environmental significance and reuse Indian Scenario Of Solid Waste Management 14 hrs

Text Books:

2. Solid Waste Management in developing countries Bhide and Sunderashan.

Reference Books:
1. Hand book on Solid Waste Disposal- Pavoni J.L.

Scheme of Examination: Student has to answer five questions out of eight, selecting one question from each unit.
UNIT - I


UNIT - II
Pile Foundations (Part 1): Introduction, Necessity of pile foundations, Classification, Load bearing capacity of single pile by Static formula, Dynamic formula, Pile load test and Penetration tests  

Pile Foundations (Part 2) Pile Groups: Introduction, Pile groups, group action of piles in sand and clay, group efficiency of piles, settlement of piles, negative skin friction & under reamed piles.

UNIT - III


UNIT - IV
Foundations on expansive soils: Introduction, Definition, Identification, Mineral Structure, Index properties of expansive soils, Swell potential and Swell pressure, Free swell, CNS layer, foundation treatment for structures in expansive soil.

Machine Foundations: Introduction, Types of Machine foundations, basic definitions, degree of freedom of a block foundation, general criteria for design of machine foundation, free and forced vibrations, vibration analysis of a machine foundation, determination of natural frequency, vibration isolation and control.

TEXTBOOKS:

REFERENCE BOOKS:
1. Pile Foundation.- Chellies
2. Geotechnical Engineering - P. Purushotham Raj
UCV 828E: ADVANCED DESIGN OF RC STRUCTURES
(by Limit State method)
CREDIT 04 (4-0-0)

UNIT I
Design of flat slabs, by direct design method (with and without drops)

UNIT II
Design of Grid floors Rankine Grashoffs method & IS code method

UNIT III
Yield line analysis of slabs- Virtual and Equilibrium methods. Design of slabs using yield line theory.
Design of continuous beams, Redistribution of moments as per IS code provision

UNIT IV
Design of bunkers & silos by John son's Theory and Airy's theory. Introduction to shells & folded plates
roofs, their forms & structural behavior Design of cylindrical shell roof with and without edge beams by
beam theory only.

Textbooks:
1. N.Krishna Raju: Advanced Reinforced Concrete design. 2nd Edition CBS Delhi
2. N.Krishna Raju: Advanced Reinforced Concrete design. 2nd Edition CBS Delhi
3. Advanced RCC Design Bhavikatti S.S. New Age

Reference Books:
2. P.C.Verghese Advanced Reinforced Concrete, PHINewDelhi.
3. G.S.Ramaswamy- Design and construction of Concrete shell roof.C.B.S. publisher
UCV 835E : PAVEMENT DESIGN
3 Credits: (3-0-0)

UNIT - 1
INTRODUCTION : Desirable characteristics of pavement, types and components, Difference between Highway pavement and Air field pavement Design strategies of variables- Functions of sub-grade, sub base- Base course-surface course- comparison between Rigid and flexible pavement

FUNDAMENTALS OF DESIGN OF PAVEMENTS: Design life- Traffic factors-Climatic factors-road geometry- Subgrade strength and drainage, Stresses and deflections, Boussinesqs theory- principle, Assumptions- Limitations and problems on above- Busmister theory- Two layered analysis-Assumptions-problems on above

UNIT II
DESIGN FACTORS: Design wheel load contact pressure- ESWL concept Determination of ESWL by equivalent deflection criteria- Stress Criteria-EWL concept.


UNIT III

DESIGN OF RIGID PAVEMENTS : Design OF C.C. Pavement by IRC; 38-2002 for dual and Tendem axle load- Reinforcement in slabs-Requirements of joints-Types of joints- Expansion joint-contraction joint-warping joint-constructionjoint-longitudinaljoint, Design ofjoints, Design of Dowel bars, Design of Tie bars-problems ofthe above

UNIT IV
FLEXIBLE & Rigid PAVEMENT FAILURES, MAINTENANCE AND EVALUATION: Types of failures, causes, remedial / maintainance measures on flexible rigid pavements-


TEXTBOOKS
1. Highway Engineering Khanna&Justo
4. Relavent IRC codes

REFERENCE BOOKS:
UNIT I
Importance of Bogue's compounds, Structure of Hydrated cement paste, Volume of hydrated Product, transition zone, Factors affecting strength, Elastic modulus.

Chemical admixtures: Mechanism of chemical admixtures, Plasticizers and superplasticizers, effect on concrete properties, dosage of superplasticizers.

Mineral admixtures: Flyash, Silica fame, GBS and their effect on concrete properties.

UNIT II
Mix Design: Factors affecting mix design, design of concrete mix by IS 10262:2009 and correct American and British methods.

Durability of current: Introduction, permeability of concrete, chemical attack, efflorescence, Alkali aggregate reaction. IS456-2000 requirements

UNIT III
RMC Concrete- manufacture concreting, placing, precautions, High volume flash concrete, self compacting concrete concept, materials, test, properties applications.

Fiber reinforced concrete- Fiber types and properties, Behaviors of FRC in compression, tension including pre-cracking stage and post cracking stages. Light weight concrete-materials properties and types.

UNIT IV
High Density concrete and High performance concrete, materials, properties and applications, typical mix

Test on hardened concrete- Effect of end condition of specimen, capping, H/D ratio, rate of loading, moisture condition, compression tension and flexure tests. NDT tests concepts- Rebound hammer.

Text Books:
1) Concrete Technology M.S.Shetty
2) IS: 10262:2009
3) Concrete Technology A.R.Santha Kumar
5) Concrete- Microstructures properties and Materials (Special student edition by ICI Chennai) by P.K.Metha & PTM Monteiro- PH
UNIT-I

INTRODUCTION: Difference between Domestic and Industrial Wastewater, Effect on Streams and on Municipal Sewage Treatment Plants. Stream Quality, Dissolved Oxygen Sag curve in Stream, Streeter-Phelps formulation, Stream Sampling, Effluent and stream Standards and Legislation to Control Water Pollution.

UNIT-II


UNIT-III

COMBINED TREATMENT: Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste, Discharge of Raw, Partially Treated and completely treated wastes to streams.

UNIT-IV

TREATMENT OF SELECTED INDUSTRIAL WASTES: Processflow sheet showing origin! sources of waste water, Characteristics of waste, alternative treatment methods, disposal, reuse and recovery along with flow sheet. Effect of waste disposal on water bodies.

The industries to be covered are:
• Cotton Textile Industry.
• Tanning Industry
• Sugar Industry
• Dairy Industry
• Canning Industry
• Brewery and Distillery Industry
• Paper and Pulp Industry
• Pharmaceutical Industry

TEXT BOOKS:
1. Industrial Waste Water Treatment- Nelson L Nemerow.,
2. Industrial Waste Treatment, Rao MN, and Dutta AX

REFERENCE BOOKS:
3. Pollution Control Processes in industries, Mahajan S.P
4. I.S. Codes

Scheme of Examination: Student has to answer five questions out of eight.
UNIT - 1


STRENGTH AND STABILITY: Strength and Stability of concentrically loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing, effect of ageing , workmanship, strength formulae and mechanism of failure for masonry subjected to direct compression. 10 Hrs

UNIT II

PERMISSIBLE STRESSES: Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses.

DESIGN CONSIDERATIONS: Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels. 08 Hrs

UNIT III

LOAD CONSIDERATIONS FOR MASONRY: Wall carrying axial load, eccentric load with different eccentricity ratios, walls with openings, free standing wall.

DESIGN OF MASONRY WALLS: Design of load bearing masonry for building up to 3 storeys using IS: 1905 and SP: 20 procedure. 12 Hrs

UNIT IV

REINFORCED MASONRY: Application, flexural and compression elements, shear walls
MASONRY WALLS IN COMPOSITE ACTION: Composite wall-beam elements, infilled frames. 10 Hrs

TEXTBOOKS:

REFERENCE BOOKS:
UNIT-I
DEVELOPMENTAL ACTIVITY AND ECOLOGICAL FACTORS: EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting, EIA, Limitations of EIA. 10hrs

UNIT-II
FRAME WORK OF IMPACT ASSESSMENT: Developmental Projects Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies. Techniques of EIA. Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. 10 hrs

UNIT-III
EIA GUIDELINES FOR DEVELOPMENTAL PROJECTS: Rapid and Comprehensive EIA. Public Participation in Environmental Decision making. Practical considerations in preparing Environmental Impact Assessment and Statements. 10 hrs

UNIT-IV
SALIENT FEATURES OF THE PROJECT ACTIVITY: Environmental Parameter Activity Relationships- Matrices EIA for water resource developmental projects, Highway Projects: Nuclear-Power plant project, Mining project (Coal, Iron ore)
ENVIRONMENTAL AUDIT: Types objectives and procedures of Environmental Audit. 10hrs

TEXTBOOKS:
2. Environment Impact Assessment - Anjaneyalu. Y.

REFERENCE BOOKS:

Question Paper Pattern for SEE:
1. Total of Eight Questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each Question should not have more than four sub divisions.
3. Any Five Full questions are to be answered choosing at least one from each unit.
UNIT-I
Introduction; difference between pipe flow and open channel flow. Classification of flow, energy equation, Momentum equation, Kinetic energy and momentum factors. 05 Hours

Uniform flow: concept, flow equations, conveyance, hydraulic exponents for uniform flow, design of channel for uniform flow. 05 Hours

UNIT-II
Critical flow: Concept, Specific energy, classification of flow, design of channels, section factors, hydraulic exponents, critical depth. 08 Hours

UNIT-III
Gradual verified flow (= GVF) concept, GVF equation, its different form. Classification and analysis of flow profiles, control sections 06 Hours

GVF Computations: methods & its solutions 05 Hours

UNIT-IV
RVF= (Rapidly varied flow) concept & hydraulic jump in rectangular channels, classification of jumps characteristics location, height. Applications of hydraulic jump, stilling basin. 11 Hours

Text Books:
1. Open Channel Hydraulics by Ven Te Chow, Maegraw hill publication International
2. Flow through Open channel K.Subramanya, Tata Maegraw hill publication N-D
3. Flow through Open channel G.Rangaraju, wylie Easteen publication N-D
4. Open Channel Hydraulics Henderson, Maegraw hill publication International
**UNIT-I**

**Introduction:** Historical development of numerical techniques, Role in investigations, research, and design in the field of Civil Engineering.  

2. Application of Solution Of Linear System Of Equations To Civil Engineering Problems  
   (i) Development of simultaneous equations from problems in construction planning, slope deflection method applied to beams frames and truss analysis.  

**UNIT-II**

3. Application of Root Finding To Civil Engineering Problems development of non-linear algebraic and transcendental equations from problems in hydraulics, irrigation engineering, structural engineering and environmental engineering.  

4. Application of Numerical Integration For Solving Simple Beam Problems  
   i. Computation of area of BMD drawn for statically determinate beams by Trapezoidal rule and Simpson's one third rule  
   ii. Development of Algorithm for Trapezoidal rule and Simpson's one third rule.  

**UNIT-III**

5. Application of Solution of Ordinary Differential Equation To Civil Engineering Problems  
   i. Application of solution of ODE by Euler's method and Runge-Kutta 4th order method in statically determinate problems, problems in Environmental engineering, problems in Hydraulics and Geotechnical engineering.  

**UNIT-IV**

6. Application of Finite Difference Techniques In Structural Mechanics:  
   i. Introduction, expression of derivatives by finite difference,b backward differences, forward differences and central differences,  
   ii. Application of finite difference method to analysis of Statically determinate beams, Statically indeterminate beams, Buckling of columns.  

**Text Books**

N Krishnaraju and KN Muthu, Numerical Methods for Engineering Problems, McMillan India Ltd.

**Books for Reference**

2. McCormick and Mario Salvadori, Numerical Methods, PHI  
4. S S Sastry, Introductory Methods of Numerical Analysis, PHI  
5. E Balagurusamy, Numerical Methods, Tata Mc Graw Hill  
6. H C Saxena, Examples in Finite Differences And Numerical Analysis, S Chand& Co. New Delhi

**Question paper pattern:**

Question paper consist of 8 questions from four units, each question carries 20 marks. The student have to answer any 5 full questions chosing at least one question from each unit.