3

SCHEME OF TEACHING AND EXAMINATION

B.E. CIVIL EINGINEERING

VIII SEMESTER

Sl. No.	Subject Code	Title of the Subject	Teaching Dept.	Teaching Hrs / Week	Examination

Theory							
Practical							
Duration							
(Hrs)							
Marks							
IA							
Theory / **Practical**							
Total							
1							
06 CV 81							
Advanced Concrete Technology							

Civil
04
--
03
25
100
125
2
06 CV 82
Design and Drawing of Steel Structures
Civil
02

03
04
25
100
125
3
06 CV 83x
Elective-IV (Group D)
Civil
04
--

03
25
100
125
4
06 CV 84x
Elective-V (Group E)
Civil
04
--
03
25

100
125
5
06 CV 85
Project Work
Civil
--
06
03
100
100

200
6
06 CV 86
Seminar
Civil
--
03
03
50
--
50

Total

14

12

19

250

500

750

Elective-IV (Group D)

Elective-V (Group E)

06 CV 831

Advanced Pre-stressed Concrete Structures

06 CV 841

Finite Element Analysis

06 CV 832

Advanced Foundation Design

06 CV 842

Reinforced Earth Structures

06 CV 833

Pavement Design

06 CV 843

Urban Transport Planning

06 CV 834

Earthquake Resistant Design of Structures

06 CV 844

Geographic Information System

06 CV 835

Industrial Waste Water Treatment

06 CV 845

Advanced Design of Steel Structures

06 CV 836

Quality Management System in Civil Engineering.

06 CV 846

Design of Hydraulic Structures

06 CV 847

Environmental Impact Assessment

VIII -SEMESTER

ADVANCED CONCRETE TECHNOLOGY

Subject Code	
: 06CV81	
IA Marks	
: 25	
No. of Lecture Hours/Week	
: 04	
Exam Hours	
: 03	

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Importance of Bogue's compounds, Structure of a Hydrated Cement Paste, Volume of hydrated product, porosity of paste and concrete, transition Zone, Elastic Modulus, factors affecting strength and elasticity of concrete, Rheology of concrete in terms of Bingham's parameter.

7 Hour

Unit - 2

Chemical admixtures- Mechanism of chemical admixture, Plasticizers and super Plasticize rs and their effect on concrete property in fresh and hardened state, Marsh cone test for optimum dosage of super plasticizer, retarder, accelerator, Air-entraining admixtures, new generation superplasticiser.

Mineral admixture-Fly ash, Silica fume, GCBS, and their effect on concrete property in fresh state and hardened state.

6 Hours

Unit - 3

Mix design - Factors affecting mix design, design of concrete mix by BIS method using IS10262 and current American (ACI)/ British (BS) methods. Provisions in revised IS10262-2004.

□□□□□□□□□□□□□□□□□**6 Hours**

Unit - 4

Durability of concrete - Introduction, Permeability of concrete, chemical attack, acid attack, efflorescence, Corrosion in concrete. Thermal conductivity, thermal diffusivity, specific heat. Alkali Aggregate Reaction, IS456-2000 requirement for durability.

7 Hours

PART - B

Unit - 5

RMC concrete - manufacture, transporting, placing, precautions, Methods of concreting- Pumping, under water concreting, shotcrete, High volume fly ash concrete concept, properties, typical mix

Self compacting concrete concept, materials, tests, properties, application and Typical mix.

6 Hours

Unit - 6

Fiber reinforced concrete - Fibers types and properties, Behavior of FRC in compression, tension including pre-cracking stage and post-cracking stages,

behavior in flexure and shear, Ferro cement - materials, techniques of manufacture, properties and

application

7 Hours

Unit - 7

Light weight concrete-materials properties and types. Typical light weight concrete mix High density concrete and high performance concrete-materials, properties and applications, typical mix.

6 Hours

Unit - 8

Test on Hardened concrete-Effect of end condition of specimen, capping, H/D ratio, rate of loading, moisture condition. Compression, tension and flexure tests. Tests on composition of hardened concrete-cement content, original w/c ratio. NDT tests concepts-Rebound hammer, pulse velocity methods.

7 Hours

TEXT BOOKS:

1. **Properties of Concrete**- Neville, A.M. - ELBS Edition, Longman Ltd., London
2. **Concrete Technology-** M.S. Shetty
3. **Concrete**- P.K. Mehta, P J M Monteiro,- Prentice Hall, New Jersey (Special Student Edition by Indian Concrete Institute Chennai)
4. ACI Code for Mix Design
5. IS 10262-2004
6. **Concrete Mix Design**- N. Krishna Raju - Sehgal Publishers
7. **Concrete Manual**- Gambhir M.L.- Dhanpat Rai & Sons, New Delhi

REFERENCE BOOKS:

1. **Advanced Concrete Technology Processes**- John Newman, Ban Seng Choo, - London.
2. **Advanced Concrete Technology Constituent materials**- John Newman, Ban Seng Choo- London
3. **Non-Destructive Test and Evaluation of Materials**- J.Prasad, C G K Nair,-Mc Graw Hill.
4. **High Performance Concrete**- Prof Aitcin P C- E and FN, London.
5. **Properties of Fresh Concrete**- Power T.C.- E and FN, London
6. **Concrete Technology**- A.R. Santhakumar,-Oxford University Press.

DESIGN AND DRAWING OF STEEL STRUCTURES

Subject Code	
: 06CV82	
IA Marks	
: 25	
No. of Lecture Hours/Week	
: 02 (T) + 3 (D)	
Exam Hours	
: 04	
Total No. of Lecture Hours	

: 26 (T) + 39 (D)

Exam Marks

: 100

PART - A

(Drawings to be prepared for given structural details)

Unit - 1

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

Unit - 2

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

Unit - 3

Column Bases: Slab base and gusseted base, grillage foundation.

13 (T) + 18 (D)

PART - B

Unit - 4

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** - Ramachandra -Standard Book House, 1705- A, Nai Sarak, Delhi-6.

2. **Design of Steel Structures** - Dayarathnam P - A.H. Wheeler & Co. Ltd.
3. **Design of Steel Structures** - Negi - Tata Mc Graw Hill Publishers.
4. **Design of Steel Structures** - Arya and Ajaman- Nem Chand & Bros. Roorkee.
5. **Design of Steel Structures.-** Raghupati
6. IS : 80 – 1984, SP 6 (1) – 1984 or Steel Table.
7. **Detailing of Structures-** Dayarathnam P
8. **Design of Steel Structures** - N. Subramanian : Oxford University, Press.

ADVANCED PRESTRESSED CONCRETE STRUCTURES

Subject Code

: 06CV831

IA Marks

: 25

No. of Lecture Hours/Week

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Anchorage Zone Stresses in Post-Tensioned Members: Introduction, stress distribution in end block, investigations on Anchorage zone stresses, Magnel and Guyon's Methods, Comparative Analysis, Anchorage zone reinforcement.

6 Hours

Unit - 2

Shear and Torsional Resistance: Shear and principal stresses, ultimate shear resistance, design of shear reinforcement, Torsion, Design of reinforcement for torsion, shear & bending.

6 Hours

Unit - 3

Composite Beams: Introduction, Composite structural members, types of composite construction, analysis of stresses, differential shrinkage, deflection, serviceability limit state, flexural strength, shear strength design.

8 Hours

Unit - 4

Tension Members: Introduction, Ties, pressure pipes – fabrication process, analysis, design and specifications, cylindrical containers-construction Techniques, analysis, Design and specifications, Ring beams.

6 Hours

PART - B

Unit - 5

Statically Indeterminate Structures: Introduction, Advantages of continuous members, effect of prestressing indeterminate structures, methods of analysis of secondary moments, concordant cable profile, Guyon's theorem, Ultimate load analysis, Determination of concordant tendon profile, Design of continuous beams and portal frames.

8 Hours

Unit - 6

Compression Members: Introduction, Columns, short columns, long columns, biaxially loaded columns, Design specification.

6 Hours

Unit - 7

Slab and Grid Floors: Types of floor slabs, Design of one way and two way slabs. Flat slabs-Indian code and distribution of prestressing tendons, Analysis and design of grid floors.

5 Hours

Unit - 8

Precast Elements: Introduction, Prestressed concrete poles-manufacturing techniques, shapes and cross sectional properties, design loads, design principles, Railway sleepers-classification and Manufacturing techniques, design loads, analysis and design Principles, Prestressed concrete pavements, slab and wall panels.

7 Hours

TEXT BOOKS:

1. **Design of Prestressed concrete structures** - Lin T.Y. and H. Burns - John Wiley & Sons, 1982.
2. **Prestressed Concrete**- N. Krishna Raju - Tata Megrahill, 3rd edition, 1995.

REFERENCE BOOKS:

1. **Prestressed Concrete Structures**- P. Dayaratnam - Oxford & IBH, 5th Edition, 1991.
2. **Prestressed Concrete**- G.S. Pandit and S.P. Gupta - CBS Publishers, 1993.
3. IS : 1343 : 1980.

ADVANCED FOUNDATION DESIGN

Subject Code
: 06CV832

IA Marks
: 25

No. of Lecture Hours/Week	

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Shallow Foundations (Part 1): Presumptive bearing capacity according to BIS, Factors affecting bearing capacity Factors influencing selection of depth of foundation, types of shallow foundations Settlement of Shallow Foundations : Immediate, co nsolidation, & differential settlements.

6 Hours

Unit - 2

Shallow Foundations (Part 2): Principles of Design of footing, Proportioning of footings for equal settlement. Design of isolated footing, combined footing, Strap footing, Strip footing and Raft (Proportioning only).

6 Hours

Unit - 3

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.

6 Hours

Unit - 4

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.

7 Hours

PART - B

Unit - 5

Well Foundations: Introduction, Different shapes and characteristics of wells. Components of well foundation. Forces acting on well foundation. Sinking of wells. Causes and remedies of tilts and shifts.

6 Hours

Unit - 6

Drilled Piers & Caissons: Introduction, construction, advantages and disadvantages of drilled piers. Design of open, pneumatic and floating caissons. Advantages and disadvantages of floating caissons.

7 Hours

Unit - 7

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.

6 Hours

Unit - 8

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

8 Hours

TEXT BOOKS:

1. **Soil Mechanics & Foundation Engineering** - V.N.S. Murthy - Pub: Sai Tech.
2. **Foundation Engineering** - Braja M. Das - Thomson.
3. **Soil Mechanics Foundations** - Dr. B.C. Punmia - Pub : Laxmi publications, pvt. Ltd.
4. **Foundation Analysis and Design** - Bowles J.E. (1996) - 5th Ed, McGraw Hill Pub. Co., New York.
5. **Advanced Foundation Engineering** - V.N.S. Murthy - Pub : Sai Tech.

REFERENCE BOOKS:

1. **Pile Foundation**.- Chellies
2. **Geotechnical Engineering.-** P. Purushotham Raj
3. **Geotechnical Engineering** - Dr. C. Venkataramaiah - Pub : New age Publications.
4. **Foundation Engineering** - Dr. P.C. Varghese :- Pub : Prentice Hall of India.

PAVEMENT DESIGN

Subject Code

: 06CV833

IA Marks

: 25

No. of Lecture Hours/Week

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

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.

6 Hours

Unit - 2

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

6 Hours

Unit - 3

Design Factors: Design wheel load – contact pressure – ESWL concept – Determination of ESWL by equivalent deflection criteria – Stress criteria – EWL concept.

6 Hours

Unit - 4

Flexible Pavement Design: Assumptions – McLeod Method – Kansas method – Tri-axial method - CBR method – IRC Method (old) - CSA Method using IRC 37-2001, problems on above.

6 Hours

PART - B

Unit - 5

Stresses in Rigid Pavement: Principle – Factors - wheel load and its repetition – properties of sub grade - properties of concrete. External conditions – joints – Reinforcement – Analysis of stresses – Assumptions – Westergaard's Analysis – Modified Westergaard equations – Critical stresses – Wheel load stresses, Warping stress – Frictional stress – combined stresses (using chart / equations) - problems on above.

6 Hours

Unit - 6

Design of Rigid Pavement: 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 – construction joint – longitudinal joint, Design of joints, Design of Dowel bars, Design of Tie bars – problems of the above

8 Hours

Unit - 7

Flexible Pavement Failures, Maintenance and Evaluation: Types of failures, causes, remedial/maintainance measures in flexible pavements – Functional Evaluation by visual inspection and unevenness measurements - Structural Evaluation by Benkelman Beam Deflection Method, Falling weight deflectometer, GPR Method.

Design factors for Runway Pavements - Design methods for Airfield pavements and problems on above.

7 Hours

Unit - 8

Rigid Pavement Failures, Maintenance and Evaluation: Types of failures, causes, remedial/maintainance measures in regid pavements – Functional Evaluation by visual inspection and unevenness measurements. Design factors for Runway Pavements - Design methods for Airfield pavements.

7 Hours

TEXT BOOKS:

1. **Highway Engineering**- Khanna & Justo

2. **Principles & Practices of Highway Engineering**- L R Kadiyalli & N B. Lal

3. **Pavement Analysis & Design** - Yang H. Huang- II edition.

4. Relavent IRC codes

REFERENCE BOOKS:

1. **Principles of Pavement Design**- Yoder and Witzack - 2nd edition, John Wileys and Sons
2. **Principles of Pavement Design**- Subha Rao

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Subject Code

: 06CV834

IA Marks

: 25

No. of Lecture Hours/Week

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Earthquake ground Motion Engineering Seismology – Introduction, Theory of plate tectonics, seismic waves, earthquake size, local site effects, seismic zoning map of India.

6 Hours

Unit - 2

Evaluation & Seismic Design ParametersTypes of Earthquakes, earthquake ground motion, characteristics, response spectra and design spectrum.

6 Hours

Unit - 3

Basic elements of Earthquakes Resistant Design Structural modelling, seismic method of analysis – code based procedures, seismic design methods – code based methods. Response control concepts, seismic education and retrofitting seismic test methods.

6 Hours

Unit - 4

Effect of Structural Irregularities on seismic performance of RC buildings. Vertical irregularity and plan configuration problems, Seismo resistant building architecture – lateral load resistant systems, building configuration, building characteristics.

6 Hours

PART - B

Unit - 5

Determination of design lateral loads Seismic design philosophy, Equivalent lateral force procedure, dynamic analysis procedure.

8 Hours

Unit - 6

Step by step procedure for seismic analysis of RC buildings (maximum of 4 storeys), Equivalent static lateral force method, response spectrum methods (without infills)

7 Hours

Unit - 7

Earthquake resistant design of RC buildings – Preliminary data, loading data, analysis of subframes,load combinations, design of subframes (maximum of 4 storeys).

7 Hours

Unit - 8

Earthquake resistant design of masonry buildings - elastic properties of structural masonry, lateral load analysis, Design of two storeyed masonry buildings.

6 Hours

TEXT BOOKS:

1. **Earthquake resistant design of structures** - Pankaj Agarwal, Manish Shrikande - PHI India.
2. **Earthquake Resistant Design of Structures** - S.K. Duggal - Oxford University Press, 2007.

REFERENCE BOOKS:

1. **Dynamics of Structures**- Clough and Penzien - (McGraw Hill book Co.).
2. **Geology with the Elements of Geomophology**- A.Y. Yakushova - (MIR Publisher, Moscow).
3. **Design of Earth Quake Resistant Structures**- Polyakov - (MIR Publisher, Moscow).
4. **Earth Quake Engineering Damage Assessment and Structural design**- S.F. Borg - (John Wiley and Sons. 1983).
5. **Earthquake Resistant Design**- Anil Chopra.

INDUSTRIAL WASTE WATER TREATMENT

Subject Code

: 06CV835	

IA Marks

: 25

No. of Lecture Hours/Week	

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Introduction: Difference between Domestic and Industrial Wastewater, Effect on Streams and on Municipal Sewage Treatment Plants. Stream Sampling, effluent and stream Standards and Legislation to Control Water Pollution.

5 Hours

Unit - 2

Stream Quality, Dissolved oxygen Sag Curve in Stream, Streeter– Phelps formulation, Numerical Problems on DO prediction.

6 Hours

Unit - 3

Treatment Methods-I: Volume Reduction, Strength Reduction, Neutralization, Equalization and Proportioning.

5 Hours

Unit - 4

Treatment Methods-II: Removal of Inorganic suspended solids, Removal of Organic Solids, Removal of suspended solids and colloids. Treatment and Disposal of Sludge Solids.

6 Hours

PART - B

Unit - 5

Combined Treatment: Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste, Discharge of Raw, Partially Treated and completely treated Wastes to Streams.

6 Hours

Unit - 6

Treatment of Selected Industrial Waste: Process flow 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:

1. Cotton Textile Industry

2. Tanning Industry

3. Cane Sugar Industry & Distillery Industry

10 Hours

Unit - 7

Treatment of Selected Industrial Waste-I:

1. Dairy Industry

2. Canning Industry

3. Steel and Cement Industry

7 Hours

Unit - 8

Treatment of Selected Industrial Waste-II:

1. Paper and Pulp Industry

2. Pharmaceutical Industry

3. Food Processing Industry

7 Hours

TEXT BOOKS:

1. **Industrial Waste Water Treatment**- Nelsol L. Nemerow.
2. **Industrial Waste Water Treatment**.- Rao MN, and Dutta A.K.
3. **Waste Water Treatment, Disposal and Reuse** - Metcalf and Eddy inc - Tata McGraw
4. Hill Publications, 2003.

REFERENCE BOOKS:

1. **Pollution Control Processes in industries-** Mahajan S.P.
2. IS Codes.

QUALITY MANAGEMENT SYSTEM

IN CIVIL ENGINEERING

Subject Code

: 06CV836

IA Marks

: 25

No. of Lecture Hours/Week

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Quality Management System - QMS: Introduction – Evolution of Quality Management System, Element of Quality, Quality Management System, Concept of Process, Network of Process in an organization, ISO 9000 Family, Applying ISO 9000 in practice, Importance of ISO 9000, Benefits of ISO standards of society, Total Quality Management, Comparison of ISO 9000 and TQM – Quality related definitions – Leaders in Quality or Quality Gurus – Customer Orientation – Mahatma Gandhi.

5 Hours

Unit - 2

Implementing ISO 9001-2000 Quality Management System: ISO 9000 – Quality Manageme nt Principles, ISO 9000 Documents Content of ISO 9001 : 2000, ISO 9001-2000 Quality Management System Requirements, General Requirements, Documentation Requirements, Management Responsibilities, Resource Management, Product Realization, Measurement, analysis and Improvement Monitoring and Measurement, Non-conforming Product, Analysis of data, Improvement, Implementing ISO 9001-2000 Quality Management System.

5 Hours

Unit - 3

Preparing A ISO 9001-200 Quality Management System for Civil Engineering: Quality Manual, Introduction, Scope of the Quality Manual, Applicability, Responsibility, Quality Management System, General Requirements, Management Responsibilities, Management Commitment, Customer Focus, Indian Construction Company Quality Policy, Planning Responsibility, Authority and Communication, Management Review, Resource Management, Provision of Resources, Human Resources Product Realization, Planning or Product Realization, Customer Related Processes, Design and Development, Purchasing, Production and Service Provision, Control of Monitoring and Measuring Devices Measurement, analysis and Improvement, Monitoring and Measurement, Non-conforming product, Analysis of data, Improvement

8 Hours

Unit - 4

Quality Management System Procedures: Introduction, procedure for management review, Format for writing procedures, procedure for preparing Quality plans/ work instructions, Contract review, Design control, Document and data control, Document numbering system, Change request, procedure for purchasing, procedure for control of customer supplied product, procedure for product identification and traceability, procedure for process control, procedure for inspection and testing, procedure for control of inspection, measuring and test equipments, procedure for inspection and test status, procedure for the control of non-conforming product,

procedure for corrective and preventive action, procedure for handling, storage, packaging and delivery, control of quality records, procedure for internal quality audits.

8 Hours

PART - B

Unit - 5

Work Instructions: Introduction – Document and Data Control, Material Procurement, Material Handling, Tendering and Estimating, Planning, Design, Training, Plant and Equipment, Bar Bending Schedule, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair Works, Road Works, Painting Works, Water Proofing works, Drainage Works, Quality Assurance and Control, Patching and Transportation of Concrete.

5 Hours

Unit - 6

Method Statement: Introduction, Concrete Works, Earthworks and Compaction, General Soil Investigation works, Survey works, Concrete Repair works, Concrete Demolition works, Road Works, Fencing works etc.

5 Hours

Unit - 7

1. **Job DESCRIPTION:** Introduction, Job Description of : Managing Director, Project Manager, Site Manager, Site Engineer, QA/QC Engineer, Foreman, Typist/Clerk, Design Engineer, Planning Engineer.

2. **Quality Control Plan/Inspection and Test Plans (ITPS):** Introduction-Preparation of Project Quality Plans, Inspection and Test plant.

8 Hours

Unit - 8

Quality Record/FORMATS: Preparation of Standard Formats: Revision Control form, Document Distribution List, Document Master List, Non-Conformance Report, Store Issue/Receipt Voucher, Local Purchase Order, Material Stock Card, Audit Notification, Quality Audit Report, Corrective Action Report, Calibration Record, Calibration Master Sheet, Work Instruction, Job Description, Contract/Tender Review Form, Quantity Survey Estimation/Take off sheet, Material/Plant Requisition, Drawing Schedule, Bar-bending Schedule, Design Calculation Sheet, Request for Inspection, Concrete Inspection Request, Inspection Check List – Drainage, Painting, Request for Inspection-Concrete Repair, Accident Report Form, Concrete Production, Concrete Compressive Strength Test Results, Request to Conduct Cube Test, Quality Awareness Training Record.

8 Hours

REFERENCE BOOKS:

1. **Quality Management System in Civil Engineering** - D.S. Rajendra Prasad - ISO 9001-2000, Sapna Book House, Bangalore.

2. **Productivity and Quality Improvement** - John L. Hardesky - McGraw Hill Book Company.
3. **ISO 9000 Concepts, Methods, Implementation-** Bagchi - Wheeler Publishing.
4. **Training Manual on ISO 9000-2000 and TQM**- Girdhar J. Gyani - Raj Publishing House.
5. **Documenting Quality for ISO 9000 and other Industry Standards -** Gary E. MacLean -Tata McGraw Hill Publishing Company Limited.

6. **Total Quality Management for Engineers** - Mohamed Zairi - Aditya Books Private Limited.
7. **Data Book for Civil Engineers Field Practice** - Elwyn E. Seelye - John Wiley & Sons, Inc.
8. **Properties of Concrete** - A.M. Neville - ELBS Publications.
9. IS : 456-2000 : Indian Standard Specifications for Plain and Reinforced Concrete Code of Practice : 4 th Revision, Bureau of Indian Standards.

10. IS : 383-1990 : Indian Standard Specifications for Coarse and Fine Aggregates from Natural Sources for Concrete : Bureau of Indian Standards.
11. **Quality Management -** Kanishka Bedi -(Oxford university press).

FINITE ELEMENT ANALYSIS

Subject Code	
: 06CV841	

IA Marks
: 25

No. of Lecture Hours/Week	

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

UNIT - 1

Introduction: Basic Concepts, Background Review: Theory of Elasticity, Matrix displacement formulation, Energy concepts, Equilibrium and energy methods for analyzing structures.

6 Hours

UNIT - 2

Raleigh **-** Ritz Method, Galerkin's Method, Simple applications in structural analysis.

8 Hours

UNIT - 3

Fundamentals of Finite Element Method: Displacement function and natural coordinates, construction of displacement functions for 2 D truss and beam elements.

5 Hours

UNIT - 4

Applications of FEM for the analysis of fine truss, continuous beam and simple plane frame problems.

7 Hours

PART - B

UNIT - 5

Analysis of 2D continuum Problems: Elements and shape functions, Triangular, rectangular and quadrilateral elements, different types of elements, their characteristics and suitability for application.

7 Hours

UNIT - 6

Polynomial shape functions, Lagrange's and Hermitian polynomials, compatibility and convergence requirements of shape functions.

6 Hours

UNIT - 7

Theory of Isoparametric Elements: Isoparametric, subparametric and super- parametric elements, characteristics of isoparametric quadrilateral elements.

7 Hours

UNIT - 8

FEM Program: Structure of computer program for FEM analysis, description of different modules, pre and post processing.

6 Hours

TEXT BOOKS:

1. **Finite Element Analysis – Theory and Programming**- Krishnamoorthy – Tata McGraw Hill Co. Ltd., New Delhi.

2. **Introduction to the Finite Element Method**- J.F. Abel and Desai. C.S. - Affiliated East West Press Pvt. Ltd., New Delhi.
3. **Finite Element Methods** - Debatis Deb - Prentice hall of India.
4. **A first course in the Finite Element Methods** - Daryl L. Logan :- Thomson India Edn.

REFERENCE BOOKS:

1. **Finite element analysis in engineering design**- Rajasekharan. S. - Wheeler Pulishers.
2. **Finite Element Procedures**- Bathe K.J. - PHI Pvt. Ltd., New Delhi.
3. **The Finite Element Method**- Zienkeiwicz. O.C. - Tata McGraw Hill Co. Ltd., New Delhi.
4. **Finite Element Analysis**- S.S. Bhavikatt, - New Age International Publishers, New Delhi.

REINFORCED EARTH STRUCTURES

Subject Code

: 06CV842

IA Marks

: 25

No. of Lecture Hours/Week

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit- 1

Basic components of reinforced soil: Introduction, General, basic mechanism of reinforced earth. Soil or fill-matrics, reinforcement bars, Metallic strips, Metallic grids, Facing Elements, concrete panel facing etc.

06 Hours

Unit- 2

Reinforced Earth Constructions: Introduction, Historical background, Principles of reinforced earth, Effect of reinforcement of soil. Mechanism of reinforced earth, Anchors, Tiebacks, Economic advantage of reinforced earth structure over similar structures.

06 Hours

Unit- 3

Design of reinforced earth Structure: Introduction, Internal and overall stability, Reinforced earth dams, slopes, Reinforced Earth foundation, typical design of retaining walls and embankments.

07 Hours

Unit- 4

Soil Nailing Techniques: Introduction, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, -construction sequence components of system, design aspects.

07 Hours

PART-B

Unit- 5

Geosynthetics (Part – 1): Introduction and overview. Historical developments, Recent developments. Classification based on materials. Geosynthetics – geotextiles, geogrids, geomembranes, geocomposites, geonets and other products, geomats, geomeshes, geowebs etc.

06 Hours

Unit- 6

Geosynthetics (Part – 2): Methods of manufacturing process. Raw materials – polypropylene (polyolefin), Polyethylene (Polyoefin), Polyester, Polyvinyl chloride, Elastomers etc, Testing & Evaluation- Hydrodynamic sieving test, Permeability test, Transmissivity test, Geotextile-Soil Filtration test etc,.

07 Hours

Unit- 7

Fiber Reinforced Soil: General, soil stabilization, reinforced soil, soil nailing, texsol, ply soil, comparison of ply soil with reinforced soil and soil nailing, types of fibers – synthetic fibers,

natural fibers, plant roots, direction of placements.

07 Hours

Unit- 8

Application of reinforced earth: Introduction, General, Reinforcement, Drainage, Filtration, Seperation, Jacketing, Erosion control and Slope protection, Advantages & elimitations, Applications of soil nailing techniques.

06 Hours

TEXT BOOKS:

1. **Design with geosynthetics**- Koerner. R.M. - Prince Hall Publication, 1994.

2. **Construction and Geotechnical Engineering using synthetic fabrics**- Koerner. R.M. & Wesh, J.P.- Wiley Inter Science, New York, 1980.

3. **Engineering with Geosynthetics**- Venkattappa Rao, G., & Suryanarayana Raju., G. V.S. - Tata Mc Graw Hill publishing Company Limited., New Delhi.

REFERENCE BOOKS:

1. **Earth reinforcement and Soil structure**- Jones CJEP- Butterworths, London, 1996.

2. **Geotextile Hand Book**- Ingold, T.S. & Millar, K.S. - Thomas, Telford, London.

3. **Earth Reinforcement Practices** - Hidetoshi Octial, Shigenori Hayshi & Jen Otani -Vol. I, A.A. Balkema, Rotterdam, 1992.

4. **Ground Engineer's reference Book**- Bell F.G. - Butterworths, London, 1987.

5. **Reinforced Earth**- Ingold, T.S. - Thomas, Telford, London.

URBAN TRANSPORT PLANNING

Subject Code

: 06CV843

IA Marks

: 25

No. of Lecture Hours/Week

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Introduction: Scope of Urban transport planning – Inter dependency of land use and traffic – System Approach to urban planning.

6 Hours

Unit - 2

Stages in Urban transport planning: Trip generation – Trip production - Trip distribution – Modal split – Trip assignment.

6 Hours

Unit - 3

Urban transport Survey - Definition of study area-Zoning-Types of Surveys – Inventory of transportation facilities – Expansion of data from sample.

8 Hours

Unit - 4

Trip Generation: Trip purpose – Factors governing trip generation and attraction – Category analysis – Problems on above

5 Hours

PART - B

Unit - 5

Trip Distribution: Methods – Growth factors methods – Synthetic methods – Fractor and Furness method and problems on the above.

5 Hours

Unit - 6

Modal split: Factors affecting – characteristics of split – Model split in urban transport planning – problems on above

6 Hours

Unit - 7

Trip Assignment: Assignment Techniques – Traffic fore casting – Land use transport models – Lowry Model – Garin Lowry model – Applications in India – (No problems on the above)

8 Hours

Unit - 8

Urban Transport Planning for small and medium cities: Introduction – Difficulties in transport planning – Recent Case Studies

8 Hours

TEXT BOOKS:

1. **Traffic Engineering and Transport Planning**- L.R. Kadiyali - Khanna Publishers.
2. **Principles of urban transport system planning** - B.G. Hutchinson - Scripta Book Co., Washington D.C. & McGraw Hill Book Co.
3. **Introduction to transportation engineering**- Jotin Kristey and Kentlal - PHI, New Delhi.

REFERENCE BOOKS:

1. **Urban Transport planning**- Black John - Croom Helm ltd, London.
2. **Urban and Regional models in geography and planning**- Hutchison B G - John Wiley and sons London.
3. **Entropy in urban and regional modeling**- Wilson A G - Pion ltd, London.

GEOGRAPHIC INFORMATION SYSTEM

Subject Code
: 06CV844
IA Marks
: 25
No. of Lecture Hours/Week
: 04
Exam Hours
: 03
Total No. of Lecture Hours
: 52
Exam Marks

: 100

PART - A

Unit - 1

Geographic Information system concepts and spatial models. Introduction, Spatial information, temporal information, conceptual models of spatial information, representation of geographic information. GIS Functionality – Introduction, data acquisition, preliminary data processing, data storage and retrieval, spatial search and analysis, graphics and interaction.

7 Hours

Unit - 2

Computer Fundamentals of GIS and Data storage, Fundamentals of computers vector/raster storage character files and binary files, file organization, linked lists, chains, trees. Coordinate systems and map projection : Rectangular polar and spherical coordinates, types of map projections, choosing a map projection.

8 Hours

Unit - 3

GIS Data models and structures – Cartographic map model, Geo-relation model, vector/raster methods, non-spatial data base structure viz., hierarchal network, relational structures.

5 Hours

Unit - 4

Digitizing Editing and structuring map data – Entering the spatial data (digitizing), the non-spatial, associated attributes, linking spatial and non-spatial data, use of digitizers and scanners of different types.

5 Hours

PART - B

Unit - 5

Data quality and sources of error – Sources of errors in GIS data, obvious sources, natural variations and the processing errors and accuracy. Principles of Spatial data access and search, regular and object oriented decomposition, introduction to spatial data analysis, and

overlay analysis, raster analysis, network analysis in GIS.

10 Hours

Unit - 6

GIS and remote sensing data integration techniques in spatial decision support system land suitability and multioriteria evaluation, role based systems, network analysis, special interaction modeling, Virtual GIS.

6 Hours

Unit - 7

Data base positioning systems, desirable characteristics of data base management systems, components of a data base management system, understanding the data conceptual modeling.

6 Hours

Unit - 8

Global positioning system, hyper spectral remote sensing, DIP techniques, hardware and software requirements for GIS, overview of GIS software.

5 Hours

TEXT BOOKS:

1. **Principles of GIS** - Peter A Burrough Reachael A Mc. Donnel - (Oxford).
2. **The GIS Book** - George B. Korte, P.E. - 5th Edn., Thomson Learning.
3. **Remote sensing and image interpretation** - Lillesand - (John Wiley and Sons).
4. **Geographical Information system**: Bemhard Sen-Wiley publications.
5. **GIS and Computer cartography** - Christopher Jones - (Longman).

ADVANCED DESIGN OF STEEL STRUCTURES

Subject Code
: 06CV845
IA Marks
: 25
No. of Lecture Hours/Week
: 04
Exam Hours
: 03
Total No. of Lecture Hours
: 52
Exam Marks

: 100

PART - A

Unit - 1

Introduction: Basic principles of design, stress strain relationship for mild steel, evaluation of full plastic moment for mild steel beams, plastic hinges, shapes factors and plastic moment. Fixed, simply supported beams, effect of partial fixity, rectangular portal frames, gable Invariance of collapse load.

5 Hours

Unit - 2

Statement of theorems with examples, application of principles of virtual work, partial and over collapse. Trial error method. Method of combined mechanisms, plastic moment distribution method and other methods of determining plastic collapse load. Estimation of deflection, factors affecting fully plastic moment.

7 Hours

Unit - 3

Minimum weight theories. Application of theorems and methods of solution. Plastic analysis applied to the design of fixed and continuous beams, portal and gable frames.

8 Hours

Unit - 4

Design of Built-up beams. Design of encased beams.

6 Hours

PART - B

Unit - 5

Design of open web structures. Advantages, Design Methods, Design of beams.

7 Hours

Unit - 6

Small moment resistant connections, large moment resistant connections, semi-rigid and behavior of semi-rigid connections, Beam line method, modified slope deflection method, modified moment distribution method.

8 Hours

Unit - 7

Principal axes of section, Maximum stress due to Unsymmetrical bending, the Z-polygon, Deflection of beams under unsymmetrical bending, design of purlins subjected to unsymmetrical bending.

5 Hours

Unit - 8

Tubular structures – Introduction, permissible stresses, tube columns and compression members, tube tension members. Design of members of tubular roof truss for given member forces and their combination joints in tubular trusses, design of tubular beams and purlins.

6 Hours

TEXT BOOKS:

1. **Plastic Analysis**- B.G. Neal.
2. **Introduction to Plastic Analysis of Steel Structures**- J.F. Banker and Heyman
3. **Plastic Analysis of steel structures**.- Beedle

REFERENCE BOOKS:

1. **Steel Structures Vol - 1 and 2**- J.F. Baker

2. **Design of Steel Structures**- Ramachandra.

3. **Design of Steel Structures**.- Arya and Ajmani

4. CMERI Design Hand Book for Open Web Structures, Durgapur.

5. SP-6 (6), IS : 800, Steel Table.

DESIGN OF HYDRAULIC STRUCTURES

Subject Code

: 06CV846	

IA Marks

: 25

No. of Lecture Hours/Week	

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Canal Design: Introduction. Cross Section of an irrigation channel. Schedule of area statistics and channel dimensions. Longitudinal section of a channel. Cross section of an unlined channel. Channel dimensions.

7 Hours

Unit - 2

Cross Drainage Works: Introduction. Types of cross drainage works. Design considerations for cross drainage works. Fluming of canal : mitra's hyperbolic transition formula. Design of protection works (hydraulic design only)

7 Hours

Unit - 3

Gravity Dams –I: Introduction. Causes of failure. Design principles. Principal and Shear Stresses. Elementary profile of a Gravity dam. Stability analysis by analytical methods.

8 Hours

Unit - 4

Gravity Dams –II: Joints in Gravity Dams. Keys and Water Stops. Temperature Control in Gravity Dams. Galleries in gravity dams. Construction of a gravity dam. Foundation grouting, Instrumentation for gravity dams.

6 Hours

PART -B

Unit - 5

Earth Dams: Introduction. Causes of failure of Earth dam. Preliminary section of an earthen dam. Determination of phreatic line by Casagrande's method and analytical method. Stability of slope by sliding wedge method (without earthquake)

6 Hours

Unit - 6

Spillways: Introduction. Components of a spillway. Ogee shaped spillway. Discharge computation for an ogee spillway. Down stream profile and up stream profile of the crest of an Ogee spillway.

6 Hours

Unit - 7

Canal Falls: Introduction. Types of falls. Design of trapezoidal notch type fall. Design of a sarda type fall

. **6 Hours**

Unit - 8

Canal regulation works: Introduction. Functions of a regulator. Design of a cross regulator and a head regulator. Devices for sediment control : silt-ejector and silt-excluder.

06 Hours

TEXT BOOKS:

1. **Irrigation, Water Power & Water Resources Engineering**- K. R. Arora - Standard Publication, New Delhi.

2. **Text Book of Irrigation Engineering and Hydraulics structures**- R.K. Sharma - Oxford & IBH Publishing Co. New Delhi.

REFERENCE BOOKS:

1. **Irrigation Engineering & Hydraulics Structures**- Santoshkumar Garg - Khanna Publishers, New Delhi.
2. **Irrigation, Water Resources & Water Power**- P.N. Modi- Standard Book House, New Delhi.

ENVIRONMENTAL IMPACT ASSESSMENT

Subject Code

: 06CV847

IA Marks

: 25

No. of Lecture Hours/Week

: 04

Exam Hours

: 03

Total No. of Lecture Hours

: 52

Exam Marks

: 100

PART - A

Unit - 1

Development Activity and Ecological Factors EIA, EIS, FONSI. Need for EIA Studies, Baseline Information,

6 Hours

Unit - 2

Step-by-step procedures for conducting EIA, Limitations of EIA.

6 Hours

Unit - 3

Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies, Techniques of EIA.

10 Hours

Unit - 4

Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.

6 Hours

PART - B

Unit - 5

EIA guidelines for Development Projects, Rapid and Comprehensive EIA.

6 Hours

Unit - 6

Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements.

8 Hours

Unit - 7

Salient Features of the Project Activity-Environmental Parameter Activity Relationships-Matrices.

4 Hours

Unit - 8

EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore).

6 Hours

TEXT BOOKS:

1. **Environmental Impact Analysis**-Jain R.K.-Van Nostrand Reinhold Co.
2. **Environment Impact Assessment.-** Anjaneyalu. Y.

REFERENCE BOOKS:

1. Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
2. **Environment Impact Assessment** - Larry W. Canter - McGraw Hill Publication.

PROJECT WORK

Subject Code

: 06CV85	

IA Marks
: 100
No. of Project Hours/Week
: 06
Exam Hours
: 03
Exam Marks
: 100

The project report shall be presented in the following form.

1. Definition of the problem.

2. Exhaustive literature survey.

3. Analysis based on type of problem. (as given above)

4. Conclusions, scope for further work.

5. References.

The Project Report shall be submitted in the prescribed standard format (04 copies) to the HOD, after the certification of the concerned guide and HOD.

SEMINAR

Subject Code	
:06CV86	

IA Marks
:50

No. of Seminar Hours/Week
: 03

Exam Hours
: --

Seminar shall be presented in the department in presence of a committee (Batch of Teachers) constituted by HOD. The seminar marks are to be awarded by the committee. Students shall submit the seminar report in the prescribed standard format.