CE – 540, to CE 544 Elective – I

CE-540 Contract law and regulation CE-
541 Railway, Bridges and Tunnels CE-
542 Industrial Waste Treatment CE -
543 Analysis of structures
CE-544 Ecology and environmental chemistry

CE 630 ELEMENTS OF STEEL DESIGN AND DRAWING

	L	T	P
Pds/week	4	-	4

RATIONALE

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise fabrication and erection of steel structures. He may also be required to design simple steel structural elements, make changes in design depending upon availability of materials (angle and channels of different sizes). He must be able to read and interpret structural drawings of different elements. This subject thus deals with elementary design principles as per BIS code of practice and their relevant drawings. Adherence to relevant Indian Standards shall be encouraged. The question paper will include questions on drawing worth 35 % weight-age.

NOTE: Weight-age of each topic for external examination is given in the brackets

DETAILED CONTENTS

THEORY

1. Structural Steel and Sections: (5%)

Properties of structural steel as per IS Code

Designation of structural steel sections as per IS handbook and IS:800 - 2007

2. Riveted Connections (10%)

Types of rivets, permissible stresses in rivets, types of riveted joints, specifications for riveted joints as per IS 800. Failure of a riveted joint. Assumptions in the theory of riveted joints. Strength and efficiency of a riveted joint. Design of riveted joints for axially loaded members (No Staggered riveting).

3. Bolted and Welded connections (10%)

Types of bolts and bolted joints, specifications for bolted joints as per IS: 800 - 2007

Types of welds and welded joints, advantages and disadvantages of welded joints and bolted joints design of fillet and butt weld. Plug and slot welds (Descriptive No numerical on plug and slot welds)

4. Tension Members (10%)

Analysis and design of single and double angle section tension members and their rivetted and welded connections with gusset plate as per IS:800

5. Compression Members (10%)

Analysis and design of single and double angle sections compression members(struts) and their welded connections with gusset plate as per IS:800

6. Roof Trusses (5%)

Form of trusses, pitch of roof truss, spacing of trusses, spacing of purlins, connection between purlin and roof covering. Connection between purlin and principal rafter (no design, only concept)

7. Columns: (5%)

Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in compression as per IS:800 for different end conditions. Analysis and Design of axially loaded single section steel column

Types of column bases (Descriptive only)

Beam and column, frame and seated connections (descriptive only, no design)

8. Beams (5%)

Analysis and design of single section simply supported laterally restrained steel beams. Introduction to plate girder and functions of various elements of a plate girder (descriptive only, no design)

9 Fabrication and Erection of Steel Structures like trusses, columns and girders (02 hrs) (5%)

8. DRAWING (35%)

Structural drawing from given data for following steel structural elements.

(i) Drawing No. 1: Roof Truss – Drawing of Fink Roof Truss with details of joints, fixing details of purlins and roof sheets.

(ii) Drawing No.2 : Column and Column Bases - Drawing of splicing of steel columns. Drawings of slab base, gusseted base and grillage base for single section steel columns.

(iii) Drawing No.3 : Column Beam Connections

(a) Sealed and Framed Beam to Beam Connections

(b) Sealed and Framed beam o Column Connections

(iv) Drawing No. 4 : Plate Girder Plan and Elevation of Plate Girder with details at supports and connection of stiffness, flange angles and cover plate with web highlighting curtailment of plates.

(vi) Drawing No. 5 : Draw atleast one sheet using CAD software

Important Note:

Use of IS: 800 – 2007 and Steel Tables are permitted in examination.

CE631 CONSTRUCTION MANAGEMENT AND ACCOUNTS

	L	T	P
Pds/week	4	-	-

RATIONALE

This is an applied civil engineering subject. The subject aims at imparting basic knowledge about construction planning and management, site organisation, construction labour, control of work progress, inspection and quality control, accidents and safety and accounts.

DETAILED CONTENTS
THEORY

CONSTRUCTION MANAGEMENT:

1. Introduction: (10%)

Significance of construction management

Main objectives of construction management and overview of the subject

Functions of construction management, planning, organising, staffing, directing, controlling and coordinating, meaning of each of these with respect to construction job.

Classification of construction into light, heavy and industrial construction

Stages in construction from conception to completion

The construction team: owner, engineer, architect and contractors, their functions and inter-relationship

2. Construction Planning: (10%)

Importance of construction planning
Stages of construction planning

- Pre-tender stage
- Contract stage

Scheduling construction works by bar charts

- Definition of activity, identification of activities
- Preparation of bar charts for simple construction work

- Preparation of schedules for labour, materials, machinery and finances for small works

- Limitations of bar charts

Scheduling by network techniques

- Introduction to network techniques; PERT and CPM, differences between PERT and CPM terminology

3. Organization: (10%)

Types of organizations: Line, line and staff, functional and their characteristics

4. Site Organization: (10%)

Principle of storing and stacking materials at site

Location of equipment

Preparation of actual job layout for a building

Organizing labour at site

5. Construction Labour: (10%)

Conditions of construction workers in India, wages paid to workers

Important provisions of the following Acts:

- Labour Welfare Fund Act 1936 (as amended)
- Payment of Wages Act 1936 (as amended)
- Minimum Wages Act 1948 (as amended)

6. Control of Progress: (10%)

Methods of recording progress

Analysis of progress

Taking corrective actions keeping head office informed

Cost time optimization for simple jobs - Direct and indirect cost, variation with time, cost optimization

7. Inspection and Quality Control: (10%)

Need for inspection and quality control 7.2 Principles of inspection 7.3 Stages of inspection and quality control for

- Earth work
- Masonry
- RCC
- Sanitary and water supply services

8. Accidents and Safety in Construction: (15%)

Accidents – causes and remedies

Safety measures for

- Excavation work
- Drilling and blasting
- Hot bituminous works
- Scaffolding, ladders, form work
- Demolitions

Safety campaign and safety devices

ACCOUNTS

9. Public Work Accounts: (15%)
Introduction, technical sanction, administrative approval, allotment of funds, re-appropriation of funds bill, contractor ledger, measurement book running and final account bills complete, preparation of bill of quantities (BOQ), completion certificate & report, hand receipt, aquittance roll. Muster Roll labour, casual labour roll-duties and responsibility of different cadres, budget-stores, returns, account of stock, misc. P.W. advances T & P – verification, survey report, road metal material charged direct to works, account - expenditure & revenue head, remittance and deposit head, defination of cash, precaution in custody of cash book, imprest account, temporary advance, treasury challan, preparation of final bills. Students must learn to prepare accounts register, stock register.

INSTRUCTIONAL STRATEGY

This is highly practice-based course and efforts should be made to relate process of teaching with direct experiences at work sites. Participation of students should be encouraged in imparting knowledge about this subject. To achieve this objective the students should be taken to different work sites for clear conception of particular topics, such as site organization, inspection of works at various stages of construction and working of earth moving equipment

RECOMMENDED BOOKS

1. Harpal Singh, "Construction Management and Accounts", Tata McGraw Hill Publishing Company., New Delhi
2. Peurifoy, RL, "Construction Planning, Equipment and Methods", McGraw Hill, Tokyo
3. Singh, Harbhajan " Construction Project Management" Abhishek Publishers, Chandigarh
4. Verma, Mahesh; "Construction Equipment and its Planning and Application
5. Dharwadker, PP; "Management in Construction Industry", , Oxford and IBH Publishing Company, New Delhi
6. Gahlot PS; Dhir, BM; "Construction Planning and Management", Wiley Eastern

Limited, New Delhi

7. Softwares :
   (a) MS Project – Microsoft USA
   (b) Primavera

CE 632 HIGHWAY AND AIRPORT ENGINEERING

	L	T	P
Pds/week	4	-	2

RATIONALE

Construction of roads is one of the area in which diploma holders in Civil Engineering may get employment. These diploma holders are responsible for construction and maintenance of highways and airports. Basic concepts of road geo-metrics, surveys and plans, elements of traffic engineering, road materials, construction of rigid and flexible pavements, special features of hill roads, road drainage system and various aspects of maintenance find place in above course.

DETAILED CONTENTS

1. Introduction (5%)

Importance of Highway engineering

1.2 Functions of IRC, CRRI, MORT&H, NHAI

1.3 IRC classification of roads

2. Road Geometrics (10%)

Glossary of terms used in road geo-metrics and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient

Average running speed, stopping and passing sight distance

Necessity of curves, horizontal and vertical curves including transition curves.

Super elevation and methods of providing super elevation

Sketch of typical cross-sections in cutting and filling on straight alignment and at a curve

(Note: No design/numerical problem to be taken)

3. Highway Surveys and Plan (10%)

Topographic map, reading the data given on a topographic map

Basic considerations governing alignment for a road in plain and hilly area

Highway location; marking of alignment

4. Road Materials (10%)

Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen (CRMB, PMB)

Binders: Common binders; bitumen, properties as per BIS specifications, penetration, softening point, ductility and viscosity test of bitumen, procedures and significance, cut back and emulsion and their uses, Bitumen modifiers

5. Road Pavements (10%)

Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components

5.2. Introduction to California Bearing Ratio, method of finding CBR value and its significance. Aggregate : Source and types, important properties, strength, durability

Sub-grade preparation: Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, making profiles of embankment,

construction of embankment, compaction, preparation of subgrade, methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for subgrade preparation. Stabilization of subgrade. Types of stabilization mechanical stabilization, lime stabilization, cement stabilization, fly ash stabilization etc.(introduction only)

Introduction to Sub Base Course and Base Course:

a) Granular base course:

(i) Water Bound Macadam (WBM)

(ii) Wet Mix Macadam (WMM)

b) Bitumen Courses:

(i) Bituminous Macadam

(ii) Dense Bituminous Macadam (DBM)

c) *Methods of construction as per MORT&H

Surfacing:

a) * Types of surfacing

i) Prime coat and tack coat

ii) Surface dressing with seal coat

iii) Open graded premix carpet

iv) Mix seal surfacing

v) Semi dense bituminous concrete

vi) Bituminous Concrete/Asphaltic concrete

vii) Mastic Asphalt

b) * Methods of constructions as per MORT&H specifications and quality control..

Rigid Pavements: Construction of concrete roads as per IRC specifications: Form work laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used.

6. Hill Roads: (10%)

Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling

Special problems of hill areas

Landslides: Causes, prevention and control measures, use of geogrids, geoflexiles, geo-synthetics

Drainage

Soil erosion

Snow: Snow clearance, snow avalanches, frost

Land Subsidence

7. Road Drainage: (10%)

Necessity of road drainage work, cross drainage works

Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage. Intercepting drains, pipe drains in hill roads, details of drains in cutting embankment, typical cross sections

8. Road Maintenance: (10%)

Common types of road failures of flexible pavements: Pot hole, rutting, alligator cracking, upheaval - their causes and remedies (brief description)

Maintenance of bituminous road such as seal-coat, patch-work and recarpetng.
Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices

9. Road Construction Equipment: (10%)
Output and use of the following plant and equipment
Hot mix plant
Tipper, tractors (wheel and crawler) scraper, bulldozer, dumpers, shovels, grader, roller, dragline
Hoist and lifts, cranes, trenching machines, tunnel boring machines.
Asphalt mixer and tar boilers
Road pavers

10 Airport Engineering :- (15%)
Necessity of study of airport engineering, aviation transport scenario in India.
Factors to be considered while selecting a site for an airport with respect to zoning laws.
Introduction to Runways, Taxiways and Apron
* An expert may be invited from field/industry for extension lecture on this topic.

PRACTICAL EXERCISES
1. Determination of penetration value of bitumen
2. Determination of softening point of bitumen
3. Determination of ductility of bitumen
4. Determination of impact value of the road aggregate
5. Determination of abrasion value (Los Angeles') of road aggregate
6. Determination of the California bearing ratio (CBR) for the sub-grade soil
7. Visit to Hot mix plant
8. Visit to highway construction site for demonstration of operation of:
Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB etc.
9. Mixing and spraying equipment
10 A compulsory visit to Ready Mix Concrete plant.

INSTRUCTIONAL STRATEGY
While imparting instructions, it is recommended that emphasis should be laid on constructional details and quality control aspects. Students should be asked to prepare sketches and drawings, clearly indicating specifications and constructional details for various sub components of a highway. It will be also advantageous to organize field visits to show the actual construction of roads at site.

RECOMMENDED BOOKS
i) Khanna, SK and Justo, CEG, "Highway Engineering", Nem Chand and Bros.,Roorkee
ii) Vaswani, NK, "Highway Engineering" , Roorkee Publishing House, Roorkee,
iii) Priyani, VB, "Highway and Airport Engineering" Anand, Charotar Book Stall
iv) Sehgal, SB; and Bhanot, KL; "A Text Book on Highway Engineering and Airport" S Chand and Co, Delhi

v) Bindra, SP; "A Course on Highway Engineering" , Dhanpat Rai and Sons, New Delhi
vi) Sharma, RC; and Sharma, SK; "Principles and Practice of Highway Engineering", Asia Publishing House, New Delhi
vii) Duggal AK, Puri VP., "Laboratory Manual in Highway Engineering", New Age Publishers (P) Ltd, Delhi,
viii) NITTTR, Chandigarh "Laboratory Manual in Highway Engineering",
ix) RK Khitoliya, "Principles of Highway Engineering (2005)", Dhanpat Rai Publishing Co., New Delhi
x) Rao, GV' Transportation Engineering
xi) Duggal AK, "Maintenance of Highway – a Reader", NITTTR, Chandigarh
xii) Duggal AK "Types of Highway constitution ", NITTTR Chandigarh
xiii) Rao, "Airport Engineering"
xiv) Singh, Jagrup, "Highway Engineering", Eagle Publications Jalandhar

IRC Publications
i) MORTH Specifications for Road and Bridge Works (Fifth Revision)
ii) MORTH Pocket book for Highway Engineers, 2001
iii) MORTH Manual for Maintenance of Roads, 1983

CE 633 IRRIGATION ENGINEERING

	L	T	P
Pds/week	4	-	-

RATIONALE

Diploma holders in Civil Engineering have to supervise the construction of canals, head works, river training works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by tube wells. This subject imparts knowledge regarding hydrology, flow irrigation-storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube wells.

NOTE: Weightage of each topic for external examination is given in the brackets (No Numericals)

DETAILED CONTENTS

1. Introduction: (5%)

Definition of irrigation
Necessity of irrigation
History of development of irrigation in India
Types of irrigation

1.1 Sources of irrigation water

2. Hydrological Cycle Catchment Area and Run-off (10%)

Rainfall , definition rain-gauges – automatic and non-automatic,
Methods of estimating average rainfall (Arithmatic system);
catchment area runoff, factors affecting runoff,
Hydrograph, basic concept of unit hydrograph.

3. Water Requirement of Crops (10%)

Definition of crop season
Duty, Delta and Base Period, Their relationship
Gross command area, culturable command area, Intensity of Irrigation, Irrigable area
Water requirement of different crops-Kharif and Rabi

3. Methods of Irrigation (10%)

Flow irrigation - its advantages and limitations
Lift Irrigation – Tube well and open well irrigation, their advantages and disadvantages
Sprinkler irrigation conditions favourable and essential requirements for sprinkler irrigation, sprinkler system – classification and component parts
Drip irrigation, suitability of drip irrigation, layout, component parts, Advantages

1. Canals (10%)

Classification, apurtenancs of a canal and their functions, sketches of different canal cross-sections (unlined)

Various types of canal lining - their related advantages and disadvantages, sketches of different lined canal x-sections

Breaches and their control

Maintenance of lined and unlined canals

2. Canal Head Works: (5%)

Definition, object, general layout, functions of different parts of head works

Difference between weir and barrage

3. Regulatory and Cross Drainage works : (10%)

Functions and necessity of the following types: aqueduct, super passage, level crossing, inlet and outlet, pipe crossing

Sketches of the above cross drainage works

4. Dams: (10%)

Classification of dams; earthen dams - types, causes of failure; crosssectionof zoned earthen dams, method of construction, gravity dams –types, cross-sections of a dam, method of construction

Concept of small and micro dam

Concept of spillways and energy dissipaters

5. Definitions of following Hydraulic Structures with Sketches (10%)

Falls

Cross and head regulators

Outlets

Canal Escapes

6. Water logging and Drainage: (5%)

Definition of water logging – its causes and effects, detection, prevention and remedies

Reclamation of soil

Surface and sub-surface drains and their layout

Concept and various techniques used for ground water re-charge

7. Tube well Irrigation: (10%)

Introduction, occurrence of ground water, location and command, advantages of tube wells

Tube wells, explanation of terms :water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers

Types of tube wells and their choice:cavity, strainer and slotted type;

Method of construction, boring, installation of well assembly, development of well.

Water Harvesting Techniques: Need and requirement of various methods, Run-off from roof top and ground surface, construction of recharge pits and recharge wells and their maintenance.

8. River Training Works (5%)
Methods of river training, guide banks, retired (levees) embankments, groynes and spurs, pitched island, cut-off

INSTRUCTIONAL STRATEGY

The teaching of the subject should be supplemented by field visits at regular intervals of time to expose the students to irrigation works. Students should asked to prepare drawings of various irrigation works.

REFERENCES

1. Singhal, RP; 'A Text Book on Irrigation Engineering', Singhal Publications
2. Bharat Singh, 'Fundamentals of Irrigation Enginering', Roorkee, Nem Chand and Bros
3. Garg, Santosh Kumar, 'Irrigation Engineering and Hydraulics Structures', Delhi, Khanna Publishers
4. Punmia, BC; and Pande Brij Bansi Lal, ' Irrigation and Water Power Engineering', Delhi, Standard Publishers Distributors
5. Sharma, RK: 'Text Book of Irrigation Engineering and Hydraulics Structures', New Delhi, Oxford and IBH Publishing Company
6. Sharma, SK; ' Principles and Practice of Irrigation Engineering', New Delhi, Prentice Hall of India Pvt. Ltd.
7. Varshney RS, Gupta SC, Gupta RL at all. "Theory and Design of Irrigation Structures", Vol. I and II,
8. Saharsabudhe SR, "Irrigation Engineering and Hydraulic Structures"
9. Priyani BB, 'The Fundamental Principles of Irrigtion and Water Power
10. BIS Codes
11. Wan. E. Houk, "Irrigation Engineering" Vol. I and II
12. Central Ground Water Board and Central Water Commission Guidelines and

CE-635 AIR POLLUTION

	L	T	P
Pds/week	4	-	2

RATIONALE

To make students acquainted with the classification, sources, effects of air pollution , various methods and equipments available for controlling it.

Note :- Weight age of each topic for external examination is given in the brackets.

DETAILED CONTENTS

THEORY:

1. Air pollutionand meteriology (30%)
   - § Air pollution
   - § Sources and types of air pollutants
   - § Effects of air pollution on human and economy.
   - § Influence of meteorological factors on air pollution
   - § Plume dispersion
   - § Sampling of particulate and gaseous pollutants

2. Air quality standards (5%)
   - § Ambient air quality standards
   - § Emission standards
   - § Air pollution indices

3. Control of Air Pollution (30%)

   - ▪ Particulate control, Source control, control equipments like settling chambers, cyclone separators, ESP, Scrubber , Filters.
   - ▪ Control of Gaseous Pollutants , absorption, adsorption devices , combustion , condensation devices.
   - ▪ dilution by Stack height , open space, Planning and zoning.

   - ▪ Simple design problems (Settling chambers, Cyclone, ESP, Filters)

4. Indoor Air pollution (5%)

   - ▪ Sources, factors causing Indoor air pollution
   - ▪ Simple Mass balance (Simple box model),
   - ▪ Control of Indoor Air Pollution

5. Vehicular Pollution (5%)

   - ▪ Pollutant formation
   - ▪ Effect of driving mode, type & density of vehicles

- Effect of Urbanization on Automobile Pollution
- Control

6. Noise Pollution (10%)

- Definition of Noise
- Sources and methodology of noise measurement
- Sound level meter, Vehicular noise measurement techniques
- Techniques for characterization of Acoustical materials
- Health effects of noise
- Noise standards and Limits
- Noise control Techniques

7. Current issues and topics

- \Green house effect and climate change
- Acid rain
- Depletion of ozone layer
- Kyoto protocol
- Clean development mechanism

PRACTICALS

1) Estimation of the SPM in the ambient air
2) Estimation of the RSPM in the ambient air
3) Estimation of the SOx in the ambient air
4) Estimation of the NOx in the ambient air
5) Estimation of the CO in the ambient air
6) Measurement of noise level

REFERENCES

1. Air Pollution and Control KVSG Murali Krishna ,Kaushal & Co Kakinada -2 (A.P)
2. Environmental Engineering Howard S. Peavy, McGraw-Hill Company
3. Air Pollution Vol I – V Stern A. C Academic press Newyork 1968
4. Air Pollution M.N. Rao & HVN Rao Tata McGraw Hill Publishing Co Ltd. New Delhi
5. Environmental Pollution control Engineering C.S. Rao wiley eastern Ltd., New Delhi

CE640 REPAIR AND MAINTENANCE OF BUILDINGS

	L	T	P
Pds/week	4	-	-

RATIONALE

One of the major concerns of a civil engineer is to take care of the building works, already constructed, in order to keep these buildings in utmost workable conditions. Usually it is being felt that the buildings deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to cracks, leakage from the roofs and sanitary/water supply fittings. Thus the need for teaching the subject in proper perspective has arisen making students aware of importance of maintenance of buildings.

DETAILED CONTENTS

1. Need for Maintenance (10%)

Importance and significance of repair and maintenance of buildings

Meaning of maintenance

Objectives of maintenance

Factors influencing the repair and maintenance

2. Agencies Causing Deterioration (Sources, Causes, Effects) (15%)

Definition of deterioration/decay

Factors causing deterioration, their classification

Human factors causing deterioration
Chemical factors causing deterioration
Environmental conditions causing deterioration
Miscellaneous factors

Effects of various agencies of deterioration on various building materials i.e. bricks, timber, concrete, paints, metals, plastics, stones

3. Investigation and Diagnosis of Defects (10%)
Systematic approach/procedure of investigation

Sequence of detailed steps for diagnosis of building defects/problems

List non-destructive and others tests on structural elements and materials to evaluate the condition of the building and study of three most commonly used tests

4. Defects and their root causes (15%)

Define defects in buildings

Classification of defects

Main causes of building defects in various building elements
Foundations, basements and DPC
Walls
Column and Beams
Roof and Terraces
Joinery
Decorative and protective finishes
Services
Defects caused by dampness

5. Materials for Repair, maintenance and protection (10%)

Compatibility aspects of repair materials

State application of following materials in repairs:
Anti corrosion coatings
Adhesives/bonding aids
Repair mortars
Curing compounds
Joints sealants
Waterproofing systems for roofs
Protective coatings

6. Remedial Measures for Building Defects (40%)

Preventive maintenance considerations

Surface preparation techniques for repair

Crack repair methods
Epoxy injection
Grooving and sealing
Stitching
Adding reinforcement and grouting
Flexible sealing by sealant
Repair of surface defects of concrete
Bug holes
Form tie holes
Honey comb and larger voids

Repair of corrosion in RCC elements

Steps in repairing
Prevention of corrosion in reinforcement

Material placement techniques with sketches
Pneumatically applied (The gunite techniques)
Open top placement
Pouring from the top to repair bottom face
Birds mouth
Dry packing
Form and pump
Preplaced – aggregate concrete
Trowel applied method

Repair of DPC against Rising Dampness
Physical methods
Electrical methods
Chemical methods
Repair of walls
Repair of mortar joints against leakage
Efflorescence removal

Waterproofing of wet areas and roofs
Water proofing of wet areas
Water proofing of flat RCC roofs
Various water proofing systems and their characteristics

Repair of joints in buildings
Types of sealing joints with different types of sealants
Techniques for repair of joints
Repair of overhead and underground water tanks

INSTRUCTIONAL STRATEGY

This is very important course and efforts should be made to find damaged/defective work spots and students should be asked to think about rectifying/finding solution to the problem. Visits to work site, where repair and maintenance activities are in progress can be very useful to students. The students will also prepare a project report based upon the available water proofing materials, sealant, special concrete for repair and adhesives and other repair material available in the market.

RECOMMENDED BOOKS

9. Gahlot P.S. and Sanjay Sharma, "Building Defects and Maintenance Management", CBS Publishers, New Delhi

10. Nayak, BS, "Maintenance Engineering for Civil Engineers", Khanna Publishers, Delhi

11. Ransom, WH "Building Failures - Diagnosis and Avoidance", Publishing E and F.N. Span

12. Hutchinson, BD; et al, "Maintenance and Repair of Buildings", Published by Newness – Butterworth

E 641 ADVANCED CONSTRUCTION TECHNOLOGY

	L	T	P
Pds/week	4	-	-
	-		

RATIONALE

This is an applied technology elective subject. In this subject, knowledge regarding earth work, construction of high rise buildings and pre-cast and pre stressed concreting operations and piles has been given. Adherence to relevant Indian Standards shall be encouraged.

NOTE: Weightage of each topic for external examination is given in the brackets

DETAILED CONTENTS

1. Earth Work (20%)

Excavation in ordinary and hard soils, excavation in soft and hard rock, blasting techniques excavation in weak soils

Side slopes of excavation; minimum working space at bottom, shoring, strutting

Dewatering technique – pumping and well points

Disposal of spoil and balancing

Safety aspects

Embankment, compaction of earth fills, protection and drainage of embankments

2. High rise construction (20%)

Construction techniques for high rise buildings

Form works and scaffolding: Requirements, Types, erection & removal and maintenance

3. Precast and Prestressed Concrete Construction (35%)

Introduction of pre-stressed and precast concrete, general theory, various technical terms, advantages.

Pretensioning – general, pretensioning yards set up, forms for pretensioned structural elements, special techniques of pretensioning.

Post tensioning: systems of post tensioning, special requirements for forming and false work, ducts and closures, placing of ducts or tendons, concreting, stressing procedure, grouting, protecting anchorage from corrosion.

Materials of prestressing – cement, aggregates, concrete, admixtures, high strength steel bars, high strength strands, vibration, curing, Codes specifications and inspection.

4. Piles: (25%)

Introduction, necessity and classification

Choice of type of pile,

Piling methods of construction of various types of piles, Pile testing: Initial load test and cyclic load test,

Anchoring techniques
Problems in pile construction.

INSTRUCTIONAL STRATEGY

The subject shall consist of visits by the students to various construction sites where they shall see the heavy construction works. They shall also contact the representatives of the manufacturers of various construction equipment and collect information from practical demonstrations, discussions and technical information received from the firms.

CE 642 INTRODUCTION TO SEISMIC PLANNING & DISASTER MANAGEMENT

	L	T	P
Pds/week	4	-	-

RATIONALE

Since 56% landmass in the Indian subcontinent lies in Zone 4 and 3 on the seismic map, it is essential to give a broad overview of geo-technical engineering to the civil engineers even at diploma level. Intricacies of complex situations are meant to be taken up at Graduate and Post-Graduate levels.

INTRODUCTION:

Major Earthquakes & Causes

I Causes of earthquakes, Tectonic Plate theory, Types of earthquakes, Seismic waves, magnitude, intensity etc. (10%)

II Theoretical concepts & Structural Behavior- Soil deposits and seismic response of foundation soils, behavior of ground motion and earthquake wave transmission, liquefaction, ductility requirements and stiffness factor, Failures-Shear, sliding, flow, deformation, etc. Detailing provisions for flexural members. (20%)

III Hazard Resistant Construction-Building response to ground shaking. Symmetry, eccentric loading, framed, structures, openings in walls masonry bond, soft floors, simple configurations & other protection measures.Introduction to building codes and other recommended practices, Building materials, components and different construction techniques. (30%)

IV Introduction to case study, damage profile and analysis. Uttarkashi/Latur/Bhuj etc. (20%)

V Disaster Management: Need for an integrated approach, Roles of engineers, Rescuer, communication system during disaster, Cyclones & Land slides – causes and remedies. (20%)

REFERECES

1 IS-4326-1993 CODE of practice for earthquake resistant construction of building. Bureau of Indian Standards.
2. Ductile detailing of reinforced concrete structure subjected to seismic forces IS 13920-1993
3. Journal of Indian Building congress Vol. IV 1997
4. Seismic design Handbook, and edition FARZAD NAEIM
5. IS 1893-1984-Criteria for earthquake resistant design for structures
6. IS 13827:1993 Guidelines for improving earthquake resistance.

CE643 ENERGY CONSERVATION TECHNIQUES IN BUILDING CONSTRUCTION

	L	T	P
Pds/week	4	-	-

INTRODUCTION (25%)

Fundamentals of Energy-Energy production systems-Heating, Ventilating and Air conditioning-Solar Energy and conservation-Energy -Energy conservation and audits-Domestic energy consumption-Savings-Challenges-Primary energy use in buildings-Residential-commercial-Institutional and public buildings

ENVIRONMENTAL (25%)

Energy and resource conservation-Design of green buildings-Evaluation tools for building energy-Embodied and operating energy-Peak demand-Comfort and indoor air quality-Visual and acoustical quality-Land, water and materials-Airborne emissions and Waste management

SERVICES (25%)

Energy efficient and environmental friendly building-Thermal phenomena-Thermal comfort-Indoor air quality-Climate, Sun and solar radiation-Psychometrics-Passive heating and cooling systems-Energy analysis -Active HVAC systems-Energy audit-Types of Energy audit-Energy flow diagram-Energy consumption/Unit production-Identification of wastage-Priority of conservative measures-Maintenance of energy management programme

ENERGY MANAGEMENT (25%)

Energy management of electrical equipment-Improvement of power factor-Management of maximum demand -Energy savings in pumps-Fans-Compressed air systems-Energy savings in lighting systems-Air conditioning systems-Applications-Facility operation and maintenance-Facility modifications-Energy recovery dehumidifier-Waster heat recovery-Steam plants and distribution systems-Improvement of boiler efficiency-

References:

1. MooreF., " Environmental control systems ", McGraw Hill, Inc., 1994.
2. Brown, G.Z, Sun, " Wind and Light: Architectural design Strategies ", John Wiley & Sons., 1985.
3. Cook, J, " Award - Winning Passive Solar Design ", McGraw Hill, 1984.

CE 644- POLLUTION CONTROL ACTS AND LEGISLATION

	L	T	P
Pds/week	4	-	-

RATIONALE

While working for any private or public organisation in the field these diploma holders have to keep various acts and legislations at the background of their knowledge so as to adhere to the standards given by BIS, WHO and other organisations. Hence this subject.

DETAILED CONTENTS

1.0 GENRAL ACTS & LAWS (60%)

Environment protection Act and rules -1986, Environmental Tribunal Act -1995 . The National Environment Appellate Authority Act 1997. The Environment (Siting for Industrial Projects) Rules 1999 . The Biomedical Waste (Management & Handling) Rules 1998. The Municipal Solid Wastes Managements and Handling Rule 2000. The Noise Pollution (Regulation and Control) Rules 2002 . The Biological Diversity Act- 2002.

2.0 Forest and Wild Life Acts (15%)

The Indian Forest Act -1927 and Amendment 1984. The Wild life Protection Act 1972 . The Forest (Conservation)Act 1980 .

3.0 WATER Acts (10%)

The Water (Prevention and Control of Pollution) Act 1974. The Water (Prevention and Control of Pollution) Cess Act 1977.

4.0 Air Acts (15%)

The Motor Vehicle Act 1988. The Air (Prevention & Control of Pollution) Act 1981. The Factories Act 1948 & Amendment in 1987.