

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC501	Course Title: RCC Design & Drawings
Semester: V	Credits: 3
Periods per week: 3 (L:3, T:0, P:0)	

COURSE OBJECTIVE

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RC Construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per IS: 456-2000

Detailed Contents

1. Introduction. (5 hours)

Concept of Reinforced Cement Concrete (RCC). Reinforcement Materials: Suitability of steel as reinforcing material, Properties of mild steel and HYSD steel. Loading on structures as per IS:875. Methods of RCC design: Working stress method, Limit state method and load factor method. Definitions and assumptions made in limit state of collapse (flexure), Partial factor of safety for materials, Partial factor of safety for loads, Design loads, Stress block, parameters.

2. Design of Beams (15 hours)

Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam. Design of singly reinforced beams by Working and Limit State Method. Design of beams for Shear and development length as per

IS:456-2000 by working stress method and limit state method. Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method.

3. Design of Slabs (10 hours)

Theory and design of simply supported one way slab by Limit State Method. Theory and design of two-way simply supported slab with corners free to Lift, design of torsional reinforcement by Limit State Method.

4. Design of Axially Loaded Column (8 hours)

Definition and classification of columns, Effective length of column, longitudinal and lateral reinforcement, Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement.

5. Drawing Exercises (8 hours)

- A. Drawing No. 1: Beams** – Drawings of Singly and doubly reinforced beams for simply supported and cantilever type along with bar bending schedule (Plan, elevation and side views).
- B. Drawing No.2: Slabs** - Drawings of One way and two way slabs for simply supported and cantilever type along with bar bending schedule (Plan, elevation and side views).
- C. Drawing No. 3: Column** - Drawings of columns for square, rectangular and circular type along with bar bending schedule (Plan, elevation and side views).
- D. Drawing No. 4:** Draw at least one sheet using CAD software

Course Outcome: -

- To develop basic understanding of reinforced concrete as a construction material.
- To develop understanding of various design philosophies and their differences.
- To understand behavior of RCC beams.
- To understand behavior of RCC members under flexural shear.
- To understand behavior of compression members.
- To understand behavior of two-way slabs using moment coefficient

Important Note: Use of BIS:456-2000 is permitted.

Instructional Strategy

Teachers are expected to give simple problems for designing various RCC structural members. For creating comprehension of the subject, teachers may prepare tutorial sheets, which may be given to the students for solving. It would be advantageous if students are taken at construction site to show form work for RCC as well as placement of reinforcement in various structural members. Commentary on BIS: 456 may be referred along with code for relevant clauses.

Recommended Books

1. Punmia, BC; "Reinforced Concrete Structure Vol I", Standard Publishers, Delhi
2. Ramamurtham, S; " Design and Testing of Reinforced Structures", Dhanpat Rai and Sons, Delhi
3. Gambhir, M.L., "Reinforced Concrete Design", Macmillan India Limited
4. Singh, Birinder "RCC Design and Drawing", Kaption Publishing House, New Delhi
5. Singh Harbhajan " Reinforced Concrete Design" Abhishek Publishers Ltd., Chandigarh
6. Mallick, SK; and Gupta, AP; "Reinforced Concrete", Oxford and IBH Publishing Co, New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT	TIME (HOURS)	MARKS(%age)
1	05	10
2	15	40
3	10	20
4	08	15
5	08	15
TOTAL	46	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC502	Course Title: Estimating Costing & Valuation
Semester: V	Credits: 3
Periods Per Week : 3 (L: 3, T:0, P: 0)	

Course Objectives

- To learn the procedure for estimating and costing of Civil Engineering works.
- To perform rate analysis for different items associated with construction projects.
- To use software for detailed estimate related to civil infrastructural projects.

Course Contents

Unit – I Fundamentals of Estimating and Costing

(8 hours)

- Estimating and Costing – Meaning, purpose, Administrative approval, Technical Sanction and Budget provision.
- Types of estimates – Approximate and Detailed estimate.
- Types and Uses of Estimates: Revised estimate, Supplementary estimate, Repair and maintenance estimate, renovation estimate.
- Roles and responsibility of Estimator.
- Checklist of items in load bearing and framed structure.
- Standard formats of Measurement sheet, Abstract sheet, Face sheet.
- Modes of measurement and desired accuracy in measurements for different items of work as per IS:1200.
- Rules for deduction in different category of work as per IS:1200.
- Description / specification of items of building work as per PWD /DSR.

Unit– II Approximate Estimates

(8 hours)

- Approximate estimate- Definition, Purpose.
- Methods of approximate estimate - Service unit method, Plinth area rate method, Cubical content method, Typical bay method, Approximate quantity method (with simple numericals)
- Approximate estimate for roads, Railways, bridges/culvert, irrigation projects and water supply projects.

Unit– III Detailed Estimate

(12 hours)

- Detailed Estimate- Definition and Purpose, Data required for detailed estimate - Civil cost, GST, Contingencies, Supervision charges, Agency charges, Procedure for preparation of detailed estimate- Taking out quantities and Abstracting.
- Methods of Detailed Estimate- Unit quantity method and total quantity method (with simple numericals)
- Long wall and Short wall method, Centre line method.
- Bar bending schedule for footing, column, beam, Lintel, chajja and slab elements
- Provisions in detailed estimate: contingencies, work charged establishment, percentage charges, water supply and sanitary Charges and electrification charges etc.
- Prime cost, Provisional sum, Provisional quantities, Bill of quantities, Spot items or Site items.

Unit– IV Estimate for Civil Engineering Works

(10 hours)

- Earthwork - Quantities for roads, Embankment and canal by – Mid sectional area method, mean sectional area method, Prismoidal and trapezoidal formula method.
- Detailed estimate for septic tank, Community well.
- Use of computer /softwares / programmes for detailed estimate Preparation of Civil Engineering Works.

Unit– V Rate Analysis

(8 hours)

- Rate Analysis: Definition, purpose and importance.

- Lead (Standard and Extra), lift, overhead charges, water charges and contractors' profit,
- Procedure for rate analysis.
- Task work- Definition, types. Task work of different skilled labour for different items.
- Categories of labours, their daily wages, types and number of labours for different items of work.
- Transportation charges of materials - Lead and Lift, Hire charges of machineries and equipments.
- Preparing rate analysis of different items of work pertaining to buildings and roads.

Suggested learning resources

1. Datta, B.N., Estimating and Costing in Civil engineering, UBS Publishers Distributors Pvt. Ltd. New Delhi.
2. Peurifoy, Robert L. Oberlender, Garold, Estimating construction cost (fifth edition), McGraw Hill Education, , New Delhi.
3. Rangwala, S.C., Estimating and Costing, Charotar Publishing House PVT. LTD., Anand.
4. Birdie, G.S., Estimating and Costing, Dhanpat Rai Publishing Company(P) Ltd. New Delhi.

Course outcomes:

After competing this course, student will be able to:

- Select modes of measurements for different items of works.
- Prepare approximate estimate of a civil engineering works.
- Prepare detailed estimate of a civil engineering works.
- Use relevant software for estimating the quantities and cost of items of works.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Topic Name	Time Allotted (Hrs)	Marks Allotted (%)
1	Fundamentals of Estimating and Costing	8	18
2	Approximate Estimates	8	17
3	Detailed Estimate	12	26
4	Estimate for Civil Engineering Works	10	22
5	Rate Analysis	8	17
Total		46	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC503	Course Title: Transportation Engineering
Semester: V	Credits: 03
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

1. To identify the types of roads as per IRC recommendation.
2. To understand the geometrical design features of different highways.
3. To perform different tests on road materials.
4. To identify the components of airport.
5. To identify the components of railway tracks.

COURSE CONTENT

DETAILED CONTENTS

Part-1 Highway Engineering

1. Introduction of Highway Engineering and Road Geometrics (12 hrs)

- 1.1 Importance of Highway engineering
- 1.2 Functions of IRC, CRRI, MORT&H, NHA I
- 1.3 IRC classification of roads
- 1.4 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
- 1.5 Average running speed, stopping and passing sight distance
- 1.6 Necessity of curves, horizontal and vertical curves. Super elevation and methods of providing super elevation

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

2. Highway alignment and survey

(03 hrs)

- 2.1 Topographic map, reading the data given on a topographic map
- 2.2 Basic considerations governing alignment for a road in plain and hilly area
- 2.3 Highway location; marking of alignment

3. Road Materials and Pavement (12 hrs)

- 3.1 Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen (CRMB, PMB)
- 3.2 Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components
- 3.3 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)
- 3.4 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
- 3.5 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.

4. Hill Roads and Road Drainage (06 hrs)

- 4.1 Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling
 - 4.2.1 Special problems of hill areas
 - 4.2.2 Landslides: Causes, prevention and control measures
 - 4.2.3 Drainage
 - 4.2.4 Soil erosion
 - 4.2.5 Snow: Snow clearance, snow avalanches, frost
 - 4.2.6 Land Subsidence
- 4.3 Necessity of road drainage work, cross drainage works
- 4.4 Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage.

5. Road Maintenance: (04 hrs)

- 5.1 Common types of road failures of flexible pavements: Pot hole, rutting, alligator cracking, upheaval - their causes and remedies (brief description)
- 5.2 Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices.

Part-2: Airport Engineering

6. Introduction to Airport Engineering (06 hrs)

- 6.1 Necessity of study of airport engineering, aviation transport scenario in India.
- 6.2 Factors to be considered while selecting a site for an airport with respect to zoning laws.
- 6.3 Introduction to Runways, Taxiways and Apron

Part-3: Railway Engineering

7. Introduction (03 hrs)

- 7.1 History of Indian Railways, Railway surveys: Factors influencing the railways route, brief description of various types of railway survey.
- 7.2 Railway Stations: purpose of providing railway station, site selection and requirement of railway station.

8. **Permanent Way and its Component Parts:** (12 hrs)
- 8.1 Classification of permanent way describing its component parts
 - 8.2 Rail Gauge: Definition, types, practice in India, Rails – types of rails
 - 8.3 Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates, spikes, bolts, keys and Chairs: Types of Anchors and anti-creepers.
 - 8.4 Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers
 - 8.5 Ballast: Function of ballast, requirements of an ideal material for ballast, Types of ballast and their merits and demerits.
9. **Point and crossing:** (06 hrs)
- 9.1 Points and crossings
 - 9.2 Important Technical terms in points and crossings
 - 9.3 Turnout
 - 9.3.1 Component parts of a turnout and their functions
 - 9.4 Crossing and their component parts
 - 9.4.1 Component parts of a crossing
 - 9.4.2 Types of crossing

COURSE OUTCOME

After completion of the course the student is able to:

1. Identify the types of roads as per IRC recommendations.
2. Implement the geometrical design features of different highways.
3. Identify different defects in roads and their maintenance.
4. To understand permanent way components and technicalities of rails.
5. To know the different components of airport.

RECOMMENDED BOOKS

1. Sehgal, SB; and Bhanot, KL; "A Text Book on Highway Engineering and Airport" S Chand and Co, Delhi
2. Bindra, SP; "A Course on Highway Engineering" , Dhanpat Rai and Sons, New Delhi

3. Khanna, SK and Justo, CEG, "Highway Engineering", Nem Chand and Bros., Roorkee
4. Duggal AK, Puri VP., "Laboratory Manual in Highway Engineering", New Age Publishers (P) Ltd, Delhi
5. Rao, "Airport Engineering"
6. Vaswani, NK, "Railway Engineering", Publishing House, Roorkee
7. Rangwala, SC, "Railway Engineering", Anand, Charotar Book Stall
8. Deshpande, R, "A Text Book of Railway Engineering", Poonam United Book Corporation

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	15
2	03	05
3	12	10
4	06	10
5	04	10
6	06	20
7	03	05
8	12	15
9	06	10
Total	64	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PC504	Course Title: Transportation Engineering Practical
Semester: V	Credits: 1
Periods Per Week: 2 (L: 0, T: 0, P: 2)	

COURSE OBJECTIVES:

1. To learn the principles and procedures of testing of coarse aggregates.
2. To study about various test on bitumen.
3. To identify the components of railway tracks and its fixtures and fastenings.

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 crushing value of the road aggregate
6. Determination of abrasion value (Los Angeles') of road aggregate
7. Determination of the California bearing ratio (CBR) for the sub-grade soil
8. Visit to Hot mix plant
9. 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.
10. Visit to railway Track for visual inspection of fixtures, fasteners and yards.

COURSE OUTCOME

After completion of the course the student is able to:

1. Perform various tests on bitumen and aggregate used for road construction.
2. Determine the strength of subgrade for construction of pavement.
3. Understand the working of Hot Mix Plant and its operation.
4. To understand permanent way components and technicalities of Railway Track.

PROGRAM:- THREE YEAR DIPLOMA IN CIVIL ENGINEERING	
Course code:- PE505	Course Title: Green Building and Energy conservation (Elective-II)
Semester : V	Credits: 3
Period Per Week: 3 (L:3,T:0,P:0)	

COURSE OBJECTIVES

This elective course aims to train the student in understanding and familiarization of different heat flow calculations and building simulation software. Several case studies will be presented to demonstrate how the various passive, low energy and energy saving concepts have been applied to real life buildings. The concepts of green buildings will be introduced and different rating systems for green buildings will be explained.

COURSE CONTENT

Unit – I Environmental Pollution

(6 hours)

Introduction: Definition of Environment and environmental pollution, Ecology, control of environmental pollution. Classification of pollution: Air pollution, Water pollution, Soil pollution, Noise pollution, Environmental laws for controlling pollution.

Unit – II - Environmental Audit and Environmental Impact Assessment (EIA) (5 hours)

Environmental Audit : Meaning, Necessity, Norms. Types: Objective-based types:
Liabilities audit, Management audit,

Activities audit

Client-driven types: Regulatory external audit, Independent external audit, Internal environmental audit, Third party audit

Environmental Impact

Assessment (EIA):Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA,

Environmental clearance for the civil engineering projects .

Unit-III - Energy and Energy conservation

(8 hours)

Renewable Energy Resources : Solar Energy, wind Energy, Ocean Energy, Hydro Energy, Biomass Energy

Non-renewable Energy Resources :Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels

Energy conservation: Introduction ,Specific objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency. Functions of Government organization working for Energy conservation and Audit(ECA)

Unit- IV - Green Building

(10 hours)

Introduction: Definition of Green building, Benefits of Green building,

4.2 Principles: Principles of Green building- planning concept of Green Building

4.3 Features: Salient features of Green Building, Environmental design (ED) strategies for building construction

4.4 Process: Improvement in environmental quality in civil structure

4.5 Materials: Green building materials and products- Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. reuse of waste material-Plastic, rubber, Newspaper wood, Non toxicaint, Green roofing,

Unit- V - Rating System for Green Building

(6 hours)

Leadership in Energy and Environmental Design (LEED) criteria,

Indian Green Building council (IGBC).Greenrating,Green Rating for Integrated Habitat Assessment.(GRIMA) criteria, HVAC unit in green Building.

COURSE OUTCOMES

The theory, practical experiences, and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above-mentioned competency:

- Identify various sources of environmental pollution.
- Implement the different steps in environmental impact assessment.
- Relate the construction of green building with the prevailing energy conservation policy and regulations.
- Construct the building using the principles of Green building and the relevant materials.
- Select the relevant rating system for assessment of given Green building.

Suggested Marks Distribution

Unit	Time(Hrs)	Marks
Unit I	6	20
Unit 1I	5	20
Unit 1II	8	20
Unit IV	10	20
Unit V	6	20
Total	35	100

References

- 1.Sustainable Construction Green building design and Delivery by Kibert C.J
- 2.Non Conventional Energy Resources by Chauhan DS Sreevastava ,SK
- 3.Handbook of Green Building Design and Construction : Sam Kubba

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PE501	Course Title: Repair & Maintenance of Buildings(Elective-II)
Semester: V	Credits: 2
Periods per week: 2 (L:2, T:0, P:0)	

COURSE OBJECTIVE

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

COURSE CONTENT

1. Maintenance And Durability Of Building

(8 hours)

Durability of civil engineering structures:– Importance of durability–Factors affecting durability of buildings– life expectancy of different classes of buildings. Environmental factors that affect the durability of structures – Effect of natural agents (Air, sun, rain, frost and biological agents such as vegetation & insects) – Environmental pollution – Effect of pollution of air, water and soil –Location effect(Marine, Industrial area etc.)– Usage aspects (Structures subjected to dynamic loading & abrasive condition)- Preventive and remedial measures.

Role of maintenance in durability and serviceability of buildings: – Necessity of maintenance – Economic aspects of maintenance. Different types of maintenance– Preventive maintenance– Remedial maintenance– Routine maintenance– Pre-monsoon maintenance- Special maintenance– Planning aspects of maintenance.

2. Failure and Repair

(12 hours)

Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof - Corrosion of reinforcement and steel structures – structural damage due to fire -Causes–Preventive and remedial measures

Cracks in buildings – Causes-Preventive and remedial measures Defects in foundation–Causes- Preventive and remedial measures. Defects in masonry– Causes- Preventive and remedial measures Defects in wooden roof– Causes-Preventive and remedial measures

Defects in concrete (RCC and PCC) - Causes Preventive and remedial measures Corrosion of reinforcement and steel structures– Causes–Preventive measures. Defects in plastering – Causes– Preventive and remedial measures Defects in flooring– Causes– Preventive and remedial measures Defects in doors and windows– Causes– Preventive and remedial measures Defects in Painting–Causes–Preventive and remedial measures Defects due to fire- Causes– Preventive and remedial measures

3. Defects

(6 hours)

Defects in Stair case, water supply system, sewage and sullage system, in drainage system - Causes – Preventive and remedial measures.

Defects in Stair case – Causes – Preventive and remedial measures.

Defects in water supply system– Causes–Preventive and remedial measures. Defects in sewage and sullage system- Causes–Preventive and remedial measures. Defects in drainage system- Causes–Preventive and remedial measures.

Defects in electrical system-Causes–Preventive and remedial measures. Building Services

4. Building Services

(6 hours)

Introduction to other building services (Topics under this section needs only brief description to understand their basic functions and requirements. Explanations with sketches are sufficient)

Lift–Location – RTT –Number of lifts –lift well and shaft–Machine room. Air conditioning system: Types of A/C – Capacity determination – Requirements for an A/C room. Electrical installations: Panelboard & Buss bar, rising mains – distribution boards – MCB – ELCB – DP - TP and change over switch switches- Telephone and TV connectivity–Requirements of domestic gas pipeline.

5. Building Repairing

(8 hours)

Retrofitting and restoration of building –Need for retrofitting and restoration – Common retrofitting works carried out– Shoring and under pinning–Different methods of retro fitting and restoration– Challenges in retrofitting and restoration works.

Deterioration of monumental and historical buildings– Common causes–Preventive measures– Restoration works– Conservation of world heritages.

Course Outcome

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

1. Understand the properties of fresh and hardened concrete.
2. Know the strategies of maintenance and repair.
3. Get an idea of repair techniques.
4. Understand the properties of repair materials
5. Understand the retrofitting strategies and techniques

REFERENCE

1. S.P25-1984-Handbook on causes and prevention of cracks in buildings
1. Philip.H.Perkins: Concrete Structures-repair water proofing and protection ;Elsevier Science
2. S.Champion :Failures and repair of concrete structures ;John Wiley & Sons
3. JacobFeld :Construction failures ;Wiley
4. P.K.Guha :Maintenance and repair of buildings- ;New Central Book Agency
5. B.S.Nayak :A book on Maintenance Engineering ;Khanna Publishers

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT	TIME (HOURS)	MARKS(%age)
1	08	20
2	12	30
3	06	15
4	06	15
5	08	20
TOTAL	40	100

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course code:- OE506	Course Title: Disaster Management (Open Elective- II)
Semester V	Credits 2
Period Per Week 2 (L:2,T:0,P:0)	

Course Objectives: -

After completing this course the student must demonstrate the knowledge and ability to:

1. Identify various types of disasters, their causes, effects & mitigation measures.
2. Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk maps.
3. Understand the use of emergency management system to tackle the problems.
4. Design early warning system and understand the utilization of advanced technologies in disaster management.
5. Compare different models for disaster management and plan & design of infrastructure for effective disaster management.

Course Contents: -

Unit I: Introduction to Disaster Management

(8 hours)

Define and describe disaster, hazard, vulnerability, risk-severity, frequency and details, impact, prevention, mitigation.

Unit II: Disasters

(8 hours)

Identify and describe the types of natural and manmade disasters, hazard and vulnerability profile of India, mountain and coastal areas, Post disaster response: Emergency medical and public health services; Environmental post disaster response (water, sanitation, food safety, waste management, disease control, security, communications); reconstruction and rehabilitation

Unit III: Roles and Responsibilities

(8 hours)

Roles and responsibilities of government, media, community, local institutions, role

of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines. Various types of disasters, their causes, effects & mitigation measures.

Unit IV: Impact of Developmental Projects

(8 hours)

Factors affecting vulnerability such as impact of development projects and environment modifications (including dams, land-use changes, urbanization etc.), Disaster impacts (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects (gender, age, special needs), Lessons and experiences from important disasters with specific reference to civil engineering.

Unit V: Disaster Mitigation and Preparedness

(8 hours)

5.1 Disaster Management Cycle-its phases; prevention,

5.2 Landslides, mechanism, causative factors, landslides monitoring, Landslide Hazard zonation

5.3 Floods, Causes Of Floods, prediction floods, drought and its impact

Course Outcome:-

CO1: Understand the need and significance of studying disaster management

CO2: Understand the different types of disasters and causes for disasters.

CO3: Gain knowledge on the impacts Disasters on environment and society

CO4: Study and assess vulnerability of a geographical area.

CO5: Students will be equipped with various methods of risk reduction measures and risk mitigation.

CO6: Understand the role of Information Technology in Disaster Management

CO7: Understand Geographical Information System applications in Disaster Management

Books and References:-

1. [www.http//ndma.gov.in](http://ndma.gov.in)
2. <http://www.ndmindia.nic.in>
3. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher
4. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92
5. Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.
6. Disaster Management, R.B. Singh (Ed), Rawat Publications
7. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction

Unit Wise Time And Marks Distribution

Unit	Time	Marks
Unit I	7	20
Unit 1I	8	20
Unit 1II	7	20
Unit IV	8	20
Unit V	8	20
Total	38	100

PROGRAM: THREE YEARS DIPLOMA IN CIVIL ENGINEERING	
Course Code: OE506	Course Title: Sustainable Construction (Open Elective-II)
Semester: Vth	Credits: 2
Periods Per Week: 2 (L:2, T:0, P:0)	

COURSE OBJECTIVE:

Objective of this course is to inculcate in students an awareness of environmental issues and the global initiatives towards attaining sustainability. The student should realize the potential of technology in bringing in sustainable practices. It will help to have an increased awareness among students on issues in areas of sustainability

COURSE CONTENT:

1. Introduction: (8 Hours)

Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM)

2. Sustainable construction materials: (7 Hours)

Carbon cycle – role of construction material: concrete and steel, etc., CO₂ contribution from cement and other construction materials, Recycled and manufactured aggregate, Role of QC and durability, Life cycle and sustainability.

3. Sustainable Construction methods: (8 Hours)

Identification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity, Precast concrete construction methods. Basics of Slip forming for tall structures. Sustainability practices: Basic concept of sustainable habitat, Methods for increasing energy efficiency in buildings.

4. GREEN BUILDINGS: (8 Hours)

Control of energy use in building – National Building Code (NBC), ECBC code, Features of LEED, Study and evaluation of current LEED and GRIHA rating for construction system -Role of insulation and thermal properties of construction materials, influence of moisture content, Performance ratings of green buildings, Zero energy building

5. Concept of LEAN

(6 Hours)

Introduction of LEAN; Lean Overview; Need for Productivity Measurement and improvement; Productivity Measurement System (PMS), Practicing Lean Tools in Project Site.

COURSE OUTCOME:

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

1. Classify the sustainable construction materials.
2. Apply different rating systems of construction/buildings as a professional.
3. Apply life cycle approach to optimize the performance of green construction materials
4. Understand the relevance and the concept of sustainability and the global initiatives in this direction

RECOMMENDED BOOKS:

1. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell,UK, 2016.
2. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hoboken, New Jersey.
3. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy efficiency Publications-Rating system, TERI Publications-GRIHA Rating system
4. Ballard, G., Tommelein, I., Koskela, L. and Howell, G., Lean construction tools and techniques, 2002
5. Ravindra K. Dhir OBE, Jorge de Brito, Rui V. Silva, Sustainable Construction materials Woodhead Publishing,2019

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time Allotted(Hrs)	Marks Allotted (%)
1	8	15
2	7	20
3	8	30
4	8	20
5	7	15
Total	38	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PE507	Course Title: Construction Safety (Elective-III)
Semester: V	Credits: 03
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

1. To study the methods for maintaining Safe Environment at Construction Sites
2. To study site specific requirements related to Safety of Personnel and machinery.
3. To understand the role and responsibilities of Safety Engineer at Site.

COURSE CONTENT:

UNIT-I

(8 hours)

Introduction to Construction Industry-
Safety issues in construction- Human factors in construction safety management.
Roles of various groups in ensuring safety in construction industry.
Framing Contract conditions on safety, and related matters.
Relevance of ergonomics in construction safety.

UNIT-II

(8 hours)

Safety in various construction operations-
Excavation- under- water works- under- pinning & shoring Ladders & Scaffolds-
Tunneling- Blasting- Demolition- Pneumatic caissons- confined Space Temporary Structures.
Indian Standards on construction safety-
National Building Code Provisions on construction safety.

UNIT-III

(8 hours)

Safety in material handling and equipments-Safety in storage & stacking of construction materials.

UNIT-IV

(8 hours)

Safety in these of construction equipments- Vehicles, Cranes, Tower Cranes, Lifting gears, Hoists & Lifts, Wire Ropes, Pulley blocks, Mixers, Conveyors, Pneumatic and hydraulic tools in construction.

Temporary power supply.

UNIT-V

(8 hours)

Contract Labor (R&A) Act and Central Rules: Definitions, Registration of Establishments, Licensing of Contractors, Welfare and Health provisions in the Act and the Rules, Penalties, Rules regarding wages.

Building & Other Construction Workers (RE&CS) Act,1996 and Central Rules, 1998: Applicability, Administration, Registration, Welfare Board & Welfare Fund, Training of Building workers, General Safety, Health & Well fare provisions, Penalties.

COURSE OUTCOMES

1. To articulate the importance of safety on the construction site.
2. Be aware of operating life cycle of infrastructure and its safe delivery, from safety in design through to operation.
3. To be able to interpret legislation including: the safety act and regulations, codes of practice, roles and responsibilities.
4. To understand the role of safety systems.
5. To identify hazards, assess risks and apply controls for construction site scenarios
6. To complete a Risk Assessment and Safe Work Method Statement for a construction site scenario.
7. Develop communication skills to improve the practice of safety
8. Complete the White Card training.

Suggested Learning Resources:

- 1.K.N.Vaid,ConstructionSafetyManagement.
2. V.J. Davies and K.Tomasin, Construction Safety Handbook.
3. James B.Fullman, Construction Safety, Security & Loss Prevention
- 4.LingerL,ModernMethodsofMaterialHandling
5. R.T. Ratay, Hand book of Temporary Structures in Construction.
6. National Building Code of India
- 7.RelevantIndianStandardspublishedbyBIS

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	20
2	08	20
3	08	20
4	08	20
5	08	20
Total	40	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PE507	Course Title: Building Services (Elective-III)
Semester: V	Credits: 3
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

1. To know the procedure for classifying various types of building services.
2. To understand the procedure for rain water harvesting.
3. To know the system for designing lighting, ventilation and acoustics for any building.

1. Water Supply (08hrs)

- 1.1 Water as a natural resource, public health significance of water quality, demand of water for domestic, commercial, industrial and public utility purposes as per BIS standards.
- 1.2 Storage and Distribution of Water: Different methods of water distribution boosting water, gravity and pressure distribution by storage tanks of individual building
- 1.3 Hot water supply for buildings including solar water heating.
- 1.4 Service connections, types and sizes of pipes, water supply fixture and installations
- 1.5 Concept of Rainwater harvesting.

2. Sound Insulation (08hrs)

- 2.1 Behavior of sound propagation
- 2.2 Acoustics in building, acoustical defects such as echo, reverberation, sound foci, methods of correction, special requirements in Buildings like auditorium, conference halls, studios etc.
- 2.3 Acoustical material and their uses in various buildings

3. Lighting and electrical Fitting (10hrs)

- 3.1 Electrical distribution-conduits for wiring, types of wiring, types of switches, various Terms used in lighting-illumination, Lux, lumen etc. distribution panels, MCB'S, ELCBS.
- 3.2 Methods of lighting, quality of light of mercury lamps, incandescent types of lamps, fluorescent tubes, CFL and other lamps, thumb rules for calculation of Illuminating level, various systems of wiring and their sustainability.
- 3.3 Symbolic representation of electrical fittings for different work areas in residential building(e.g. bed room, living room, kitchen, study and toilet).

4. Heat, Ventilation and Air Conditioning (HAVC) (08hrs)

- 4.1 Behaviour of heat propagation, thermal insulating materials and their co-efficient of thermal conductivity
- 4.2 General methods of thermal insulation. Thermal insulation of roofs, exposed walls.
- 4.3 Ventilation: Definition, necessity and System of ventilation(Mechanical)
- 4.4 Different types of Air conditioning systems and their use in buildings
- 4.5 Essentials of air-conditioning system

5. Vertical Transportation Systems (04hrs)

Classification and types of lifts, lift sizes, provision and installation, escalators,sizes,safety norms to be adopted

6. Fire Fighting Services (04 hrs)

Causes of fire in Buildings, classification of building materials according to firerating;fire alarm systems introduction to fire fighting system, precaution and controlling devices (fire panels, door and windows automation, fire hydrants andsprinklers) fire escape elements (staircases, ramps,), provisions in building from fire safety angle as per BIS; heat detectors, and fire detection system.

COURSE OUTCOME

After completion of the course the student is able to:

- 1. Classify various types of building services as per functional requirements.
- 2. Propose the fire safety requirements for multi-storied building.
- 3. Evaluate the potential of rain water harvesting and solar water heater system for the given type of building.

4. Justify the necessity of designing the system of lighting and ventilation for the given type of building.

RECOMMENDED BOOKS

1. Handbook of Designing and Installation of Services in Building Complex – High-rise Buildings by VK Jain, Publication. Khanna Publishers, New Delhi Khanna Publishers, New Delhi.
2. Water and Waste Water Technology by Mark J. Hammer and Mark J. Hammer (Jr.); Prentice Hall of India (P) Ltd., New Delhi – 110001
3. A Text Book of Environmental Science by Subramanian; Narora Publicity (Pvt.) Ltd., New Delhi – 110 002
4. National Building Code
5. Akhil Kumar das, Principles of fire safety Engineering: Understanding Fire and Fire protection, PHI learning Pvt. Ltd., New delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	20
2	08	10
3	10	20
4	08	20
5	04	10
6	04	20
Total	42	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: PE507	Course Title: Solid Waste Management (Elective-III)
Semester: V	Credits: 3
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

Course Objectives:

Following are the objectives of this course:

- To know various sources of solid.
- To learn techniques of collection and transportation of solid waste.
- To know various methods of disposal of solid waste.
- To understand and identify different biomedical and E- waste and their subsequent disposal techniques.

CourseContent:

Unit–1Introduction

(6 hrs)

- 1.1** Definition of solid waste, different solid waste – domestic Waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.
- 1.2** Sources of solid waste, Classification of solid waste– hazardous and non-hazardous waste.
- 1.3** Physical and chemical characteristics of municipal solid waste.

Unit–2 Storage, Collection and Transportation of Municipal Solid Waste

(8 hrs)

- 2.1** Collection, segregation, storage and transportation of solid waste.
- 2.2** Tools and Equipment-Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community bin- like movable and stationary bin.

- 2.3** Transportation vehicles with their working capacity -Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumpers, Compactor vehicles. Transfer station- meaning, necessity, location.
- 2.4** Role of rag pickers and their utility for society.

Unit–3 Composting of Solid Waste

(8 hrs)

- 3.1 Concept of composting of waste, Principles of composting process. Factors affecting the composting process.
- 3.2 Methods of composting– Manual Composting–Bangalore method, Indore Method, Mechanical Composting –Dano Process, Vermi composting.

Unit 4: Techniques for Disposal of Solid Waste

(12 hrs)

- 4.1** Solid waste management techniques– solid waste management hierarchy, waste prevention and waste reduction techniques
- 4.2** Land filling technique, Factors to be considered for site selection, Land filling methods- Area method, Trench method and Ramp method, Leachate and its control, Biogas from landfill, Advantages and disadvantages of landfill method, Recycling of municipal solid waste
- 4.3** Incineration of waste: Introduction of incineration process, Types of incinerators - Flash, Multiple chamber Incinerators, Products of incineration process with their use, Pyrolysis of waste–Definition, Methods

Unit–5 Biomedical and E-waste management

(10 hrs)

- 5.1** Definition of Biomedical Waste.
- 5.2** Sources and generation of Biomedical Waste and its classification
- 5.3** Biomedical waste Management technologies.
- 5.4** Definition, varieties and ill effects of E-waste,
- 5.5** Recycling and disposal of E-waste.

Suggested learning resources:

- Gupta O.P, Elements of Solid Hazardous Waste Management, Khanna Book Publishing Co., Delhi Ed. 2018
- Bhide, A.D., Solid Waste Management, Indian National Scientific Documentation Centre, New Delhi.

- George Tchobanoglous, Kreith, Frank., Solid Waste, McGraw Hill Publication, New Delhi.
- Sasi kumar, K., Solid Waste Management, PHI learning, Delhi.
- Hosetti, B.B., Prospect and Perspectives of Solid Waste Management, New Age International Publisher.

Courseoutcomes:

After completing this course, student will be able to:

1. Identify the sources of solid waste.
2. Select the relevant method of collection and transportation of solid waste.
3. Suggest an action plan for composting of solid waste.
4. Devise suitable disposal technique for solid waste
5. Use the relevant method for disposal of Bio-medical and E-waste.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	08	20
3	08	20
4	12	25
5	10	20
Total	44	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: SI/PR508	Course Title: Survey Camp
Semester: V	Credits: 2
Duration : - 10 days	

COURSE OBJECTIVE:

1. To impart intensive training in the use of surveying instruments.
2. To train the students to appreciate practical difficulties in surveying on the field.
3. Making the students conversant with the camp life.
4. Training the students to communicate with the local population.
5. Providing an opportunity to the students to develop team spirit.

Task

Preparation of topographical plan of a given area on Auto Cad. The survey camp will be organized for duration of 15 days time span. The students may be assigned an undulated area of about 1.5 to 2.00 sq.km. with level difference of 15m consisting of good number of physical features such as buildings, roads, bridges, culverts, railway tracks, electric lines etc. They are required to prepare the topographic map of above areas showing various features along with contours using a suitable contour intervals. They will mark a road alignment of given gradient connecting any two stations on the map consisting some horizontal and vertical curves and will prepare estimate of earthwork and submit the detailed technical report indicating therein practical difficulties faced during surveying for the features like ridge, line, valley lines, saddle cliffs etc. The students should be divided in the groups consisting of 10-15 in numbers. They are required to submit the Report of work done, during survey camp, which will be dully examined, while awarding the internal assessment.

Course Outcome: -

After undergoing the survey camp, students will be able to: Interpret the contours

1. Work in a teamwork

- 2.** Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map
- 3.** Calculate the earth work
- 4.** Prepare a topographical plan of a given area

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: SI/PR509	Course Title: Minor Project/ Internship
Semester: V	Credits: 3
Periods Per Week: 6 (L: 0, T: 0, P: 6)	

COURSE OBJECTIVE:

Minor project work aims at exposing the students to field practices, size and scale of operations and work culture at works sites. For this purpose, students during middle of course, are required to be sent at different work sites where some construction activities are in progress or some operations are going on. Depending on the interests of the students, they may be sent to following (or any other field project related to Civil Engineering):

COURSE CONTENT

- i) Building construction sites
- ii) Water treatment plant, Sewage treatment plant
- iii) Crusher plant, Cement Manufacturing Plant, Brick kiln
- iv) Highway construction site
- v) Material and Soil testing laboratory, Soil investigation projects
- vi) Hydel Power Project
- vii) Land surveying projects
- viii) Community development works
- ix) Constructional site like building, bridge, tunnel, canal lining, highway, railway track, irrigation works etc

As a minor project activity, each student is supposed to study the operations at site and prepare a detailed project report of the observations/processes seen by him/her and give seminar using computer aided presentation slides using photographs. These students should be guided by respective subject teachers. Each

teacher may guide a group of 10 – 15 students. The teachers along with field supervisors will conduct performance assessment of students. Some of the projects are suggested below:

1. Survey of a village approach road, drawings of L-section and x-sections
2. Estimation of white washing and distempering in hostel building.
3. Preparation of detailed estimate with drawings of septic tank for 30-40 users
4. Plumbing work and installation of PVC over-head water tank on a toilet block and then prepare report
5. Construction of different components of a building
6. Identification of water-supply fittings and replacement of defective fittings and then prepare report.
7. Construction of a pipe/slab culvert
8. Ferro-cement construction techniques a) Low cost housing b) New construction materials
9. Study and preparation of models of hydraulic pumps.

This Industry oriented minor project work will carry 50 marks/ half of the credits for internal assessment.

A group of students not exceeding 5 may work on any one project. Each student will prepare the project report of the activities observed by him. They will study the whole process of the plant, and explain the same in their project report. Further they are required to present the Project Report of work done by them through seminar in the class for internal assessment. External examiner will ask the questions on the construction, working, processes observed by the students during their project work: Shortcomings in the works (site) and their remedial measures may be suggested by the students.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: AU510	Course Title: Indian Constitution
Semester: V	Credits: 0
Periods Per Week: (L: 2, T: 0, P: 0)	

COURSE OBJECTIVES:

- Understand what a Constitution is and why it is necessary.
- Understand how Constitutions embody certain ideals.
- Understand the difference between monarchy, dictatorship and democracy.
- Learn why there is a need for limits on power in a democratic form of government.

COURSE CONTENT:

Unit 1 – The Constitution - Introduction

(6 hours)

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

Unit 2 – Union Government

(6 hours)

- Structure of the Indian Union
- President – Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and Rajya Sabha

Unit 3 – State Government

(6 hours)

- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit 4 – Local Administration

(8 hours)

- District Administration
- Municipal Corporation
- Zila Panchayat

Unit 5 – Election Commission

(8 hours)

- Role and Functioning
- Chief Election Commissioner
- State Election Commission

COURSE OUTCOME:

- Understand the meaning and importance of Constitution
- Explain about making of Indian Constitution - contribution of Constituent assembly on it.
- Describe the Salient (Outstanding) features of Indian Constitution.
- Describe the importance of Preamble of the Indian Constitution and its significance.

Suggested Learning Resources:

1. Ethics and Politics of the Indian Constitution, Rajeev Bhargava, Oxford University Press, New Delhi, 2008

2. The Constitution of India, B.L. Fadia, Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India, DD Basu, Lexis Nexis; Twenty-Third 2018 edition

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	06	20
3	06	20
4	08	25
5	08	20
Total	32	100