

CURRICULUM
FOR
FIFTH SEMESTER
DIPLOMA
IN
CIVIL ENGINEERING

STUDY SCHEME FOR FIFTH SEMESTER CIVIL ENGG

Code	Subjects	Study Scheme			Total Hours L+T+P	Credits			Total Credits L+T+P
		Periods Per Week				L	T	P	
		L	T	P					
CIVPC501	RCC Design & Drawing	3	0	0	3	3	0	0	3
CIVPC502	Estimating, Costing & Valuation	3	0	0	3	3	0	0	3
CIVPC503	Transportation Engineering	3	0	0	3	3	0	0	3
CIVPC504	Transportation Engineering Practical	0	0	2	2	0	0	1	1
Elective- II		2	0	0	2	2	0	0	2
CIVPE505	Green Buildings & Energy Conservation								
CIVPE506	Repair & Maintenance of Buildings								
Open Elective - II		2	0	0	2	2	0	0	2
CIVOE507	Disaster Management								
CIVOE508	Sustainable Construction								
Elective- III		3	0	0	3	3	0	0	3
CIVPE509	Construction Safety								
CIVPE510	Building Services								
CIVPE511	Solid Waste Technology								
CIVSC512	Survey Camp	Two Weeks Duration During the Semester				0	0	2	2
CIVMP513	Minor Project Cum Industrial Training	04 -06 Weeks Duration at the end of 3 rd /4 th Semester				0	0	3	3
AU515	Indian Constitution (Audit Course)	2	0	0	2	0	0	0	0
		18	0	2	20*	16	0	6	22

* Remaining Classes in the week can be used for Project/Survey Camp/Other Curricular/Extra-Curricular Activities.
(Only 14 Weeks Functional out of 16 due to 02 Weeks Survey Camp)

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: CIVPC501	Course Title: RCC Design & Drawings
Semester: 5th	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

COURSE CONTENT

1. Introduction

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

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. Drawing of Beams (Plan, Elevation and Side View)

3. Design of Slabs

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. Drawing of Slabs (Plan, Elevation and Side View)

4. Design of Axially Loaded Column

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. Drawing of Columns (Plan, Elevation and Side View)

COURSE OUTCOME

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

- 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:

1. *Use of BIS: 456-2000 is permitted.*
2. *No Separate Drawing Shall be provided in the exam. However neat sketches will be asked to be drawn in the answer sheets. Moreover, Student has to draw detailed neat sketches in the classrooms on drawing sheets for practice.*

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, NewDelhi
5. Singh Harbhajan" ReinforcedConcrete 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 NO.	TIME ALLOTTED (HRS)	MARKS ALLOTTED (%)
1	05	10
2	18	45
3	14	25
4	10	20
TOTAL	47	100

Final Draft Curriculum 5th Sem

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: CIVPC502	Course Title: Estimating Costing & Valuation
Semester: 5th	Credits: 3
Periods Per Week : 3 (L: 3, T:0, P: 0)	

COURSE OBJECTIVE:

The objective is to acquire proficiency in estimating and costing procedures for Civil Engineering projects, including conducting rate analysis for various construction items. Additionally, proficiency in utilizing software for detailed estimates pertaining to civil infrastructure projects is sought.

COURSE CONTENT

1. Fundamentals of Estimating and Costing

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

2. Approximate Estimates

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

3. Detailed Estimate

- 3.1 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.

- 3.2 Methods of Detailed Estimate- Unit quantity method and total quantity method (with simple numericals)
- 3.3 Long wall and Short wall method, Centre line method.
- 3.4 Bar bending schedule for footing, column, beam, Lintel, chajja and slab elements
- 3.5 Provisions in detailed estimate: contingencies, work charged establishment, percentage charges, water supply and sanitary Charges and electrification charges etc.
- 3.6 Prime cost, Provisional sum, Provisional quantities, Bill of quantities, Spot items or Site items.

4. Estimate for Civil Engineering Works

- 4.1 Detailed Estimate of Two-Roomed Building with Verandah
- 4.2 Earthwork - Quantities for roads, Embankment and canal by – Mid sectional area method, mean sectional area method, Prismoidal and trapezoidal formula method.
- 4.3 Detailed estimate for septic tank, Community well.
- 4.4 Use of computer /softwares / programmes for detailed estimate Preparation of Civil Engineering Works.

5. Rate Analysis and Valuation

- 5.1 Rate Analysis: Definition, purpose and importance.
- 5.2 Lead (Standard and Extra), lift, overhead charges, water charges and contractors' profit,
- 5.3 Procedure for rate analysis.
- 5.4 Task work- Definition, types. Task work of different skilled labour for different items.
- 5.5 Categories of labours, their daily wages, types and number of labours for different items of work.
- 5.6 Transportation charges of materials - Lead and Lift, Hire charges of machineries and equipments.
- 5.7 Preparing rate analysis of different items of work pertaining to buildings and roads.
- 5.8 Valuation: Purpose , Principles and Terms related to Valuation
- 5.9 Methods of Valuation

COURSE OUTCOME

After completing 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.

RECOMMENDED BOOKS:

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, DhanpatRai Publishing Company (P) Ltd. New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	8	18
2	8	17
3	8	20
4	14	30
5	8	15
Total	42	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: CIVPC503	Course Title: Transportation Engineering
Semester: 5 th	Credits: 03
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

The objectives encompass identifying road types according to IRC guidelines, comprehending various highway geometrical design aspects, conducting diverse tests on road materials, recognizing airport components, and identifying railway track elements.

COURSE CONTENT

Part-1 Highway Engineering

1. Introduction of Highway Engineering and Road Geometrics

- 1.1 Importance of Highway engineering
- 1.2 Functions of IRC, CRRRI, MORT&H, NHAI
- 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

- 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

- 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

- 4.1 Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling
- 4.2 Special problems of hill areas
 - 4.2.1 Landslides: Causes, prevention and control measures
 - 4.2.2 Drainage
 - 4.2.3 Soil erosion
 - 4.2.4 Snow: Snow clearance, snow avalanches, frost
 - 4.2.5 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:

- 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

1. Introduction to Airport Engineering

- 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

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

2. Permanent Way and its Component Parts:

- 2.1 Classification of permanent way describing its component parts
- 2.2 Rail Gauge: Definition, types, practice in India, Rails – types of rails
- 2.3 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-creeper.
- 2.4 Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers
- 2.5 Ballast: Function of ballast, requirements of an ideal material for ballast, Types of ballast and their merits and demerits.

3. Point and crossing:

- 3.1 Points and crossings
- 3.2 Important Technical terms in points and crossings
- 3.3 Turnout
 - 3.3.1 Component parts of a turnout and their functions
- 3.4 Crossing and their component parts
 - 3.4.1 Component parts of a crossing
 - 3.4.2 Types of crossing

COURSE OUTCOME

After completion of the course the student is able to:

- Identify the types of roads as per IRC recommendations.
- Implement the geometrical design features of different highways.
- Identify different defects in roads and their maintenance.
- To understand permanent way components and technicalities of rails.
- 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

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit 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: CIVPC504	Course Title: Transportation Engineering Practical
Semester: 5 th	Credits: 1
Periods Per Week: 2 (L: 0, T: 0, P: 2)	

COURSE OBJECTIVE:

The objectives are to understand testing principles for coarse aggregates, explore various bitumen tests, and recognize components and fixtures of railway tracks.

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.

PROGRAM: THREE YEAR DIPLOMA IN CIVIL ENGINEERING	
Course code:-CIVPE505	Course Title: Green Building and Energy conservation (Elective-II)
Semester :5 th	Credits:3
Period Per Week: 3 (L: 3, T:0, P:0)	

COURSE OBJECTIVE:

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

1. Environmental Pollution

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.

2. Environmental Audit and Environmental Impact Assessment (EIA)

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.

3. Energy and Energy conservation

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)

4. Green Building

4.1 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 toxicant, Green roofing,

5. Rating System for Green Building

- 5.1 Leadership in Energy and Environmental Design (LEED) criteria,
- 5.2 Indian Green Building council (IGBC). Green rating, Green Rating for Integrated Habitat Assessment (GRIMA) criteria, HVAC unit in green Building.

COURSE OUTCOME:

- 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.

RECOMMENDED BOOKS

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

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	20
2	5	20
3	8	20
4	10	20
5	6	20
Total	35	100

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: CIVPE506	Course Title: Repair & Maintenance of Buildings(Elective-II)
Semester: 5th	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

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 alloading & 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

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

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

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: Panel board & 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

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

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

- Understand the properties of fresh and hardened concrete.
- Know the strategies of maintenance and repair.
- Get an idea of repair techniques.
- Understand the properties of repair materials
- Understand the retrofitting strategies and techniques

RECOMMENDED BOOKS:

1. S.P25-1984-Handbook on causes and prevention of cracks in buildings
2. Philip. H. Perkins: Concrete Structures-repair water proofing and protection; Elsevier Science

3. S. Champion : Failures and repair of concrete structures; John Wiley & Sons
4. Jacob Feld :Construction failures ;Wiley
5. P.K. Guha :Maintenance and repair of buildings- ;New Central Book Agency
6. B.S. Nayak :A book on Maintenance Engineering ;Khanna Publishers

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	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: CIVOE507	Course Title: Disaster Management (Open Elective- II)
Semester: 5th	Credits: 2
Period Per Week: 2 (L: 2, T: 0, P: 0)	

COURSE OBJECTIVE:

The objective involves identifying different disasters and their causes, effects, and mitigation strategies; comprehending disaster management phases and crafting vulnerability and risk maps; utilizing emergency management systems; creating early warning systems and leveraging advanced technologies; comparing various disaster management models; and designing infrastructure for efficient disaster management.

COURSE CONTENT

1. Introduction to Disaster Management

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

2. Disasters

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, and communications); reconstruction and rehabilitation

3. Roles and Responsibilities

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.

4. Impact of Developmental Projects

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.

5. Disaster Mitigation and Preparedness

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:

- Understand the need and significance of studying disaster management
- Understand the different types of disasters and causes for disasters.
- Gain knowledge on the impacts Disasters on environment and society
- Study and assess vulnerability of a geographical area.
- Students will be equipped with various methods of risk reduction measures and risk mitigation.
- Understand the role of Information Technology in Disaster Management
- Understand Geographical Information System applications in Disaster Management

RECOMMENDED BOOKS:

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

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	TIME (HOURS)	MARKS(%age)
1	7	20
2	8	20
3	7	20
4	8	20
5	8	20
Total	38	100

PROGRAM: THREE YEARS DIPLOMA IN CIVIL ENGINEERING	
Course Code: CIVOE508	Course Title: Sustainable Construction (Open Elective-II)
Semester: 5th	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:**

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:

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:

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:

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

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:

- Classify the sustainable construction materials.
- Apply different rating systems of construction/buildings as a professional.
- Apply life cycle approach to optimize the performance of green construction materials
- 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

Topic No.	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: CIVPE509	Course Title: Construction Safety (Elective-III)
Semester: 5th	Credits: 03
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

The study aims to examine methods for maintaining a safe environment at construction sites, including site-specific safety requirements for personnel and machinery. Additionally, it seeks to elucidate the role and responsibilities of safety engineers on-site.

COURSE CONTENT:**1. UNIT-I**

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

2. UNIT-II

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

3. UNIT-III

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

4. UNIT-IV

- 4.1 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.
- 4.2 Temporary power supply.

5. UNIT-V

- 5.1 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.

- 5.2 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

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

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

RECOMMENDED BOOKS:

1. K. N. Vaid, Construction Safety Management.
2. V.J. Davies and K. Tomasin, Construction Safety Handbook.
3. James B. Fullman, Construction Safety, Security & Loss Prevention
4. Linger L, Modern Methods of Material Handling
5. R.T. Ratay, Hand book of Temporary Structures in Construction.
6. National Building Code of India
7. Relevant Indian Standards published by BIS
- 8.

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT 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: CIV PE510	Course Title: Building Services (Elective-III)
Semester: 5th	Credits: 3
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

The objective is to gain knowledge on the classification of building services, understand rainwater harvesting procedures, and grasp the design systems for lighting, ventilation, and acoustics in buildings.

COURSE CONTENT

1. Water Supply

- 1.1 Water as a natural resource, public health significance of water quality, and 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

- 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 materials and their uses in various buildings

3. Lighting and electrical Fitting

- 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)

- 4.1 Behavior 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 uses in buildings.
- 4.5 Essentials of air- conditioning system

5. Vertical Transportation Systems

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

6. Fire Fighting Services

Causes of fire in Buildings, classification of building materials according to fire rating; fire alarm systems introduction to firefighting system, precaution and controlling devices (fire panels, door and windows automation, fire hydrants and sprinklers) 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:

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

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit 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: CIVPE511	Course Title: Solid Waste Management (Elective-III)
Semester: 5 th	Credits: 3
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

The objectives outlined are related to solid waste management. It covers understanding sources of solid waste, learning collection and transportation techniques, exploring disposal methods, and identifying biomedical and e-waste for appropriate disposal.

COURSE CONTENT

1. Introduction

- 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.

2. Storage, Collection and Transportation of Municipal Solid Waste

- 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.

3. Composting of Solid Waste

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

2. Techniques for Disposal of Solid Waste

- 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

3. Biomedical and E-waste management

- 3.1 Definition of Biomedical Waste.
- 3.2 Sources and generation of Biomedical Waste and its classification
- 3.3 Biomedical waste Management technologies.
- 3.4 Definition, varieties and ill effects of E-waste,
- 3.5 Recycling and disposal of E-waste.

COURSE OUTCOME

After completion of the course the student is able to:

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

RECOMMENDED BOOKS:

1. Gupta O.P, Elements of Solid Hazardous Waste Management, Khanna Book Publishing Co., Delhi Ed. 2018
2. Bhide, A.D., Solid Waste Management, Indian National Scientific Documentation Centre, New Delhi.
3. George Techobanoglous, Kreith, Frank, Solid Waste, McGraw Hill Publication, New Delhi.
4. Sasikumar,K., Solid Waste Management, PHI learning, Delhi.
5. Hosetti, B.B., Prospect and Perspectives of Solid Waste Management, New Age International Publisher.

UNIT WISE TIME AND MARKS DISTRIBUTION

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

Final Draft Curriculum 5th Sem

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: CIVSC512	Course Title: Survey Camp
Semester: 5th	Credits: 2 (LTP=002)
Duration : - 02 Weeks Duration During the Semester	

COURSE OBJECTIVE:

The training program aims to provide intensive instruction in surveying instrument use, fostering practical field understanding, familiarizing students with camp life, honing communication skills with local communities, and cultivating team spirit among participants.

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

- Work in a teamwork
- Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map
- Calculate the earth work
- Prepare a topographical plan of a given area

PROGRAM: THREE YEAR DIPLOMA IN CIVIL ENGINEERING	
Course Code: CIVMP513	Course Title: Industrial Training Cum Minor Project
Semester: 5 th	Credit: 3
Duration: 04 to 06 Weeks at the end of 3 rd /4 th Semester	

COURSE OBJECTIVE:

Industrial training for the Diploma in Civil Engineering aims to provide students with practical exposure and hands-on experience in various aspects of the field. The training focuses on enhancing students' technical skills in areas such as construction management, structural engineering, surveying, and environmental engineering, aligning with current industry standards and practices. The program emphasizes the development of problem-solving abilities by engaging students in real-world civil engineering challenges and fostering their ability to work collaboratively in teams. Additionally, students will gain proficiency in project management, communication, and professional ethics, preparing them for the expectations of the construction and infrastructure sectors.

Practical training opportunities include site visits, surveying exercises, CAD software usage, material testing, and exposure to modern construction techniques, ensuring that students are well-prepared for entry-level positions in the industry. The training also emphasizes the importance of adaptability, flexibility, and a commitment to continuous learning, essential qualities for success in a constantly evolving field. By the end of the program, students will have acquired not only technical expertise but also the soft skills and industry exposure necessary to excel in their careers as civil engineering professionals.

Students are required to attend an industrial training program for a period of 04 to 06 weeks during the summer/winter vacations after completing the 3rd or 4th Semester (2nd Year) in any of the relevant or related domains. Students may also opt to undergo training in Online Mode/Work from Home.

The students must submit a copy of the training certificate to the institute at the time of the exam, which will be mandatory. A viva will be conducted during both the internal and external examinations. The student will be evaluated based on the knowledge gained and skills acquired during the training period.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: AU515	Course Title: Indian Constitution
Semester: V	Credits: 0
Periods Per Week: (L: 2, T: 0, P: 0)	

COURSE OBJECTIVE:

The objective paragraph outlines the foundational aspects of constitutional understanding and governance. It begins with the importance of comprehending the nature and necessity of a Constitution, emphasizing its embodiment of societal ideals. Additionally, it underscores the distinction between various forms of governance, including monarchy, dictatorship, and democracy. Lastly, it highlights the necessity of establishing limits on power within a democratic framework, thus ensuring responsible governance.

COURSE CONTENT**1. The Constitution - Introduction**

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

2. Union Government

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

3. State Government

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

4. Local Administration

- 4.1 District Administration
- 4.2 Municipal Corporation
- 4.3 Zila Panchayat

5. Election Commission

- 5.1 Role and Functioning
- 5.2 Chief Election Commissioner
- 5.3 State Election Commission

COURSE OUTCOME:

After completion of the course the student is able to:

- 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.

RECOMMENDED BOOKS:

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

UNIT WISE TIME AND MARKS DISTRIBUTION

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