Sixth Semester

STEEL STRUCTURES DESIGN (DCE-601)

Discipline core (DC): Credit 3(3-0-0)

Objective:

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise steel construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials. This subject thus deals with elementary design principles as per BIS code of practice IS: 800

COURSE OUTLINE:

1. Structural Steel and Sections:

1.1 Properties of structural steel as per IS Code

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

2. Riveted Connections:

Types of rivets, permissible stresses in rivets, types of riveted joints, specifications for riveted joints as per IS 800. Failure of a riveted joint. Assumptions in the theory of riveted joints. Strength and efficiency of a riveted joint. Design of riveted joints for axially loaded members.

3. Welded connections:

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

4. Tension Members

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

5. Compression Members

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

6. Roof Trusses

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

7. Columns:

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

8. Beams

Analysis and design of single section simply supported laterally restrained steel beams.

9 Fabrication and Erection of Steel Structures like trusses, columns and girders

10 Masonry structures – Design of brick column and wall foundations

RECOMMENDED BOOKS

1. Duggal SK, "Design of Steel Structures" by Standard Publishers, Delhi

2. Birinder Singh, “Steel Structures Design and Drawing”, Kaption Publishing House, Ludhiana

EARTHQUAKE RESISTANT BUILDING CONSTRUCTION (DCE-603)
Open elective (OE): Credit 3(3-0-0)

Objective: Diploma holders in civil engineering have to supervise construction of various earthquake resistant buildings. Therefore, the students should have requisite knowledge regarding terminology of earthquake and the precautions to be taken while constructing earthquake resistant buildings

COURSE OUTLINE:

1. Elements of Engineering Seismology

General features of tectonic of seismic regions. Causes of earthquakes, Seismic waves, earthquake size (magnitude and intensity), Epicentre, Seismograph, Classification of earthquakes, Seismic zoning map of India, Static and Dynamic Loading, Fundamental period.

2. Seismic Behaviour of Traditionally-Built Constructions of India

Performance of building during earthquakes and Mode of failure (Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failure)

3. Special construction method, tips and precautions to be observed while planning, designing and construction of earthquake resistant building.

4. Introduction to IS: 4326, IS: 13828, IS: 1893(Part 1), 154326 and IS: 13920 (latest edition)

5. Seismic Provision of Strengthening and Retrofitting Measures for Traditionally-Built Constructions, Brick and RCC Structures

6. Provision of reinforcement detailing in masonry and RC constructions

7. Disaster Management: Disaster rescue, psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment, safety in rescue operations, debris clearance and casuality management.

RECOMMENDED BOOKS

1. Elements of Earthquake Engineering by Jai Krishana and AR Chandersekaran; Sarita Parkashan, Meerut.

2. Manual Published by Earthquake Engineering department, IIT Roorkee / IIT Kanpur

CONSTRUCTION MANAGEMENT AND ACCOUNTS (DCE-603)
Open elective (OE): Credit 3(3-0-0)

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

COURSE OUTLINE:
CONSTRUCTION MANAGEMENT:
1. Introduction:
1.1 Significance of construction management
1.2 Main objectives of construction management and overview of the subject
1.3 Functions of construction management, planning, organising, staffing, directing, controlling and coordinating, meaning of each of these with respect to construction job.
1.4 Classification of construction into light, heavy and industrial construction
1.5 Stages in construction from conception to completion
1.6 The construction team: owner, engineer, architect and contractors, their functions and inter-relationship
2. Construction Planning:
2.1 Importance of construction planning
2.2 Stages of construction planning
- Pre-tender stage
- Contract stage
2.3 Scheduling construction works by bar charts
- Definition of activity, identification of activities
- Preparation of bar charts for simple construction work
3. Organization:
3.1 Types of organizations: Line, line and staff, functional and their characteristics
4. Site Organization:
4.1 Principle of storing and stacking materials at site
4.2 Location of equipment
4.3 Preparation of actual job layout for a building
4.4 Organizing labour at site
5. Construction Labour:
5.1 Conditions of construction workers in India, wages paid to workers
5.2 Important provisions of the following Acts:
- Labour Welfare Fund Act 1936 (as amended)
- Payment of Wages Act 1936 (as amended)
- Minimum Wages Act 1948 (as amended)
6. Control of Progress:
6.1 Methods of recording progress

6.2 Analysis of progress
6.3 Taking corrective actions keeping head office informed
6.4 Cost time optimization for simple jobs - Direct and indirect cost, variation with time.

ACCOUNTS

9. Public Work Accounts:

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

RECOMMENDED BOOKS

1. Harpal Singh, "Construction Management and Accounts", Tata McGraw Hill Publishing Company., New Delhi
2. Peurifoy, RL, "Construction Planning, Equipment and Methods", McGraw Hill, Tokyo

ADVANCED CONSTRUCTION TECHNOLOGY (DCE-603)
Open elective (OE): Credit 3(3-0-0)

Objective: This is an applied technology subject. In this subject, knowledge regarding earth work, construction of high rise buildings and precast and pre stressed concreting operations and piles has been given.

COURSE OUTLINE:

1. Earth Work

1.1 Excavation in ordinary and hard soils, excavation in soft and hard rock, blasting techniques excavation in weak soils
1.2 Side slopes of excavation; minimum working space at bottom, shoring strutting
1.3 Dewatering technique – pumping and well points
1.4 Disposal of spoil and balancing
1.5 Safety aspects
1.6 Embankments, compaction of earth fills, protection and drainage of embankments

2. High Rise Construction

2.1 Construction techniques for high rise buildings
2.2 Construction techniques for chimneys and cooling towers

3. Precast and Prestressed Concrete Construction

3.1 Introduction of prestressed concrete, general theory. Linear post tensioning – general, post tensioning advantages to the design engineer and the contractor
3.2 Linear post tensioning system, high strength post tensioned stands, parallel lay wire, high strength alloy steel bars
3.3 Techniques of post tensioning – general, special requirements for forming and false work, ducts or tendons, concreting, stressing procedure, grouting, protecting anchorage from corrosion
3.4 Pretensioning - general, pretensioning yards set up, forms for pretensioned structural elements, special techniques of pretensioning
3.5 Materials of prestressing – cement, aggregates concrete, admixtures, vibration, curing, light weight aggregates, high strength steel bars, high strength stand, stress relaxation, galvanization. Codes specifications and inspection, manufacturers of prestressing equipment, specifications, sizes and costs
4. Piles
Piles; basic piling methods for various types of piles, methods of pile driving, non – displacement piles, problems in pile construction, pile testing

Note: To visit high rise buildings and fly over's construction site and their report writing

RECOMMENDED BOOKS

1. Gupta, Sushil Kumar, Singla, DR. and juneja BM, "A Text Book of Building Construction"; Ludhiana Katson Publishing House.
2. Deshpande, RS and Vartak, GV; "A Text Book of Building Construction''; Poona United Book Corporation.

ENVIRONMENTAL POLLUTION CONTROL (DCE-602)
Discipline core (DC): Credit 3(3-0-0)

Objective: Civil Engineering diploma holders must have the knowledge of different types of environmental aspects related to development activities so that they may help in maintaining the ecological balance and control pollution. They should also be aware of the related environmental laws for effectively combating environmental pollution. The class room instructions should be supplemented by field visits to show the pollution caused by urbanization and the compartment measures being adopted at site. Extension lectures by experts may be encouraged.

COURSE OUTLINE:

1. Study of Importance of Environmental Engineering
Importance of clean environment, control of environmental pollution with respect to air, land and water. Conservation of natural resources, environmental education and awareness.
2. Water Pollution
Causes of pollution in surface and underground water eutrophication of lakes and its preventing measure; BIS standards for water quality.

3. Air Pollution

Definition, principal air pollutants, atmospheric parameters influencing air pollution, types of air contaminants and their sources, effects of air pollution on human beings, plants, animals, automobile pollution, BIS ambient air quality standards and measures to combat air pollution

4. Noise Pollution

Definition, unit of measurement of noise, sources and effects of noise pollution

5. Effects of mining, blasting and deforestation

Ill effects of mining, blasting and deforestation on the environment human life and wild life.

6. Land Use

Effect of land use on environmental quality, land use and natural disasters,(land slides etc) soil degradation problems - erosion, water logging, soil pollution etc.

7. Environmental Impact Assessment

Definition and requirements, environmental impact assessment. Flour chart of environmental impact assessment methodology. Describe the need and importance of EIA.

8. Legislation to Control Environmental Pollution (idea)

Indian legislative acts for water, land and air pollution control – provisions, scope and implementation

9. Global Issues of Environmental Engineering

Global warming, ozone depletion, acid rain, oil pollution; radiation hazards and their control, concept of clean technology and carbon credits.

10. Renewable Source of Energy

Role of non-conventional sources of energy (biogas, solar, wind etc) in environmental protection. Conservation of energy resources like coal, oil etc., alternative fuels, bio-diesel etc.

RECOMMENDED BOOKS

1. Deswal DS and Deswal SS "Environmental Engineering" Dhanpat Rai and Company (P) Ltd., Delhi

ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT (DEE-604)

Discipline Electives (DE): Credit 3(3-0-0)

Objective: In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management

COURSE OUTLINE:

SECTION – A ENTREPRENEURSHIP

1. Introduction

1.1 Concept /Meaning and its need

1.2 Qualities and functions of entrepreneur and barriers in entrepreneurship

1.3 Sole proprietorship and partnership forms of business organisations

1.4 Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)

2. Market Survey and Opportunity Identification

2.1 Scanning of business environment

2.2 Salient features of National and State industrial policies and resultant business opportunities

2.3 Types and conduct of market survey

2.4 Assessment of demand and supply in potential areas of growth

2.5 Identifying business opportunity

2.6 Considerations in product selection

3. Project report Preparation

3.1 Preliminary project report

3.2 Detailed project report including technical, economic and market feasibility

3.3 Common errors in project report preparations

3.4 Exercises on preparation of project report

SECTION –B MANAGEMENT

4. Introduction to Management

4.1 Definitions and importance of management

4.2 Functions of management: Importance and Process of planning, organizing, staffing, directing and controlling

4.3 Principles of management (Henri Fayol, F.W. Taylor)

4.4 Concept and structure of an organisation

4.5 Types of industrial organisations

a) Line organisation b) Line and staff organisation c) Functional Organisation

5. Leadership and Motivation

a) Leadership

5.1 Definition and Need

5.2 Qualities and functions of a leader

5.3 Manager Vs leader

5.4 Theories of motivation (Maslow, Herzberg, McGregor)

6. Management Scope in Different Areas

a) Human Resource Management i) Introduction and objective ii) Introduction to Man power planning, recruitment and selection iii) Introduction to performance appraisal methods

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)

2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi

MAJOR PROJECT WORK (DCE-605)
Discipline core (DC) : Credit 4(0-0-8)

Objective: Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience. It is necessary that each organization is visited well in advance by respective teachers and activities to be performed by students are well defined. The chosen activities should be such which are of curricular interest to students and of professional value to industrial/field organizations. Each teacher is expected to supervise and guide 5 - 6 students.
Effort should be made to identify actual field problems to be given as project work to the students. Project selected should not be too complex which is beyond the comprehension level of the students.

CONTENT:
According to the need of the polytechnic, the following major projects are suggested:
1. Construction of a small concrete road consisting of following activities
- Survey and preparation of site plan
- Preparation of drawings i.e. L-Section and X-Section
- Estimating earth work
- Preparation of sub grade with stone ballast
- Laying of concrete
- Testing of slump, casting of cubes and testing
- Material estimating and costing with specifications
- Technical report writing
2. Water Supply system for a one or two villages
- Surveying
- Design of water requirements and water distribution system
- Preparation of drawing of overhead tank - Material estimating and costing
- Specifications - Technical report writing
3. Construction of seating benches in polytechnic campus
4. Welding of angle iron and Expanded metal jali to prepare fencing in polytechnic campus
5. Construction of toilets and baths for a shopping complex in a township
6. Construction of bridal path 4 kms long
7. Construction of shopping complex by detailing of RCC drawings, estimating and costing of material
8. Rainwater harvesting
- Assessment of catchment's area - Intensity of rainfall - Collection of water - Monitoring during rainy season

9. Design and construction of septic tank with soak pit for 100 users
10. Preparing plumbing detailed drawings of a two storey building and material estimate and costing

Employable skills (DCE-606)
Discipline core (DC): Credit 2(0-0-4)

Objective: Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workplace. This subject is included to develop employability skills amongst the students

DETAILED CONTENTS

1.Industrial Scenario Engineering Education and expectations of competences from an engineer by employer

2.Personality types, characteristic and features for a successful engineer

3.Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment

4.Managing project

·Leadership·Motivation

·Time management

·Resource management

·Computer Software

·Interpersonal relationship

·Engineer economics and fundamentals

5.Effective Communication

·Listening

Speaking

·Writing

·Presentation Technique/Seminar

·Group discussion

6.Preparing for Employment

·Searching for job/job hunting

·Resume Writing

·Interview technique in personal interview telephonic interview, panel interview, group interview, video conference

7.Managing Self

·Managers body, mind, emotion and spirit

·Stress Management

·Conflict resolution

8.Continuing professional development

·Organising learning and knowledge

·Use of computer for organising knowledge resource

9.Creativity, Innovation and Intellectual property right

·Concept and need in present time for an engineer

10.Basic rules, laws and norms to be adhered by engineers during their working