

COURSE TITLE : CONSTRUCTION MANAGEMENT & SAFETY ENGINEERING
COURSE CODE : 5012
COURSE CATEGORY : C
PERIODS/WEEK : 4
PERIODS/SEMESTER : 52
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Planning and Organizational aspects Constructional planning organizational structure	13
2	Execution of works, Contracts, Tender and tender notices, Measurement of works, Payment of bills	13
3	Introduction to Human Resource Management, Stores, Managing materials and machinery	13
4	Principles of safety in construction activity , Entrepreneurship and management, Introduction to small scale Industries, Introduction to quality control, T.Q.M and I.S.O 9000	13
Total		52

COURSE OUTCOME

SI.	Sub	Student will be able to
1	1	Understand the importance and functions of management in construction projects and various elements involved in it.
	2	Apply the project management tools and analyze the network model
	3	Understand various aspects of project execution
2	1	Understand various aspects of HR management
	2	Understand various aspects of stores management
	3	Understand types of construction equipments used in projects and their specific uses.
3	1	Comprehend the factors related to construction safety
	2	Understand the importance of entrepreneurship
	3	Understand various quality management systems

SPECIFIC OUTCOME

MODULE - I

1.1.0 Understand the importance and functions of management in construction projects and various elements involved in it.

- 1.1.1 Explain the salient features of construction projects.
- 1.1.2 List different types of construction projects.
- 1.1.3 Identify various elements of construction projects.
- 1.1.4 Identify the activities performed by construction industry.
- 1.1.5 Illustrate the functions of construction management.
- 1.1.6 Explain the steps involved in planning and its importance in project implementation.
- 1.1.7 Identify the details to be collected to prepare a DPR.
- 1.1.8 Distinguish between planning and scheduling.
- 1.1.9 Explain the functions of management during project implementation.
- 1.1.10 State the factors affecting productivity.
- 1.1.11 Identify the different stages of construction projects.
- 1.1.12 Distinguish different types of estimate and identify their purpose.
- 1.1.13 State the purpose of preparing feasibility report and project report.
- 1.1.14 Explain the importance of financial management and fund flow in projects.
- 1.1.15 Illustrate the fiscal management system of the state such as budget.
- 1.1.16 Distinguish between AS and TS.
- 1.1.17 Explain the organizational structure of PWD/PSU and duties of officers.
- 1.1.18 Distinguish between various categories of establishments in project site and their role.

1.2.0 Apply the project management tools and analyze the network model.

- 1.2.1 Classify different project management tools.
- 1.2.2 Describe the method of preparing bar chart.
- 1.2.3 Explain the network models of project management.
- 1.2.4 Distinguish between CPM and PERT.
- 1.2.5 Draw a CPM network.
- 1.2.6 Analyze a CPM network and determine the project duration & critical path
- 1.2.7 Solve a CPM network to calculate the EPO, LPO, EST, EFT, LST, LFT and the floats.
- 1.2.8 Determine the expected time of an activity in PERT from the three time estimate.
- 1.2.9 Compare Bar chart, CPM and PERT.
- 1.2.10 List the project management software packages.
- 1.2.11 Explain the concepts of project crashing, resource leveling and resources smoothing.
- 1.2.12 Draw the sketch of a job layout at project site.
- 1.2.13 Explain the concept of work study.

MODULE- III

2.1.0 Understand various aspects of project execution.

- 2.1.1 Define tender
- 2.1.2 Explain tender procedure.
- 2.1.3 Explain various aspects of contract – types, validity and execution of agreement.
- 2.1.4 Differentiate different types of contract, its applicability, merits and limitations of each type.

- 2.1.5 Explain the departmental execution of work and the situations for adopting it.
- 2.1.6 State the importance of quality control, its need and objectives.
- 2.1.7 Identify the role of specification, supervision, check lists, inspection, sampling and testing in quality control.
- 2.1.8 Explain the rules for taking measurements and recording it.
- 2.1.9 Classify different types of bills and the situation in which they are adopted.
- 2.1.10 List various deductions made from the bill and understand their purpose.
- 2.1.11 Explain different modes of payment and the method of accounting payments.

MODULE- III

3.1.0 Understand various aspects of HR management.

- 3.1.1 State the importance of HR management in construction organization and various sources for HR.
- 3.1.2 Explain different stages of HR procurement and distinguish each phase.
- 3.1.3 Describe different methods adopted for HR development and increase productivity.
- 3.1.4 Identify various labour welfare measures
- 3.1.5 State the salient features of workmen compensation act.
- 3.1.6 Identify the role of trade unions in industry.

3.2.0 Understand various aspects of stores management

- 3.2.1 Distinguish different types of stores.
- 3.2.2 State the importance of store management in construction projects and the basic principles.
- 3.2.3 Explain the procedure of store keeping and issue of material from store.
- 3.2.4 Explain the process of dealing with surplus stores, writing off and stock verification.
- 3.2.5 Explain the process of procuring materials to store and identify the re-order level & EOQ for each item.
- 3.2.6 Solve transportation problem and describe the procedures related to transportation of goods by road and rail.

3.3.0 Understand types of construction equipments used in projects and their specific uses.

- 3.3.1 Identify different equipments used in construction projects
- 3.3.2 State the specific use of various construction equipments.
- 3.3.2 Identify the factors related to selection of equipment.
- 3.3.3 Identify the suitable mode of procuring equipment based on the situation.

MODULE- IV

4.1.0 Comprehend the factors related to construction safety

- 4.1.1 State the basic principles of construction safety
- 4.1.2 Identify major causes of accidents at site and the effects.
- 4.1.3 Explain various safety practices to be followed at project site.
- 4.1.4 State the precautions to be taken in material handling.
- 4.1.5 Identify various occupational hazards.
- 4.1.6 State the role of supervisor in maintaining safety at site.
- 4.1.7 Explain the role of legislation in ensuring safety at construction industry

4.2.0 Understand the importance of entrepreneurship.

- 4.2.1 Explain the importance of entrepreneurship.
- 4.2.2 State the factors which promote entrepreneurship and the expectations of the society.
- 4.2.3 State the role of an entrepreneur in nation building.
- 4.2.4 Compare the entrepreneurial style with conventional managerial style.
- 4.2.5 Identify the organizations supporting entrepreneurship and state their role.
- 4.2.6 Identify the requirements to become a licensed supervisor.

4.3.0 Understand various quality management systems.

- 4.3.1 Illustrate the importance of quality control in construction projects.
- 4.3.2 Explain the various elements of TQM
- 4.3.3 State the role of TQM in construction
- 4.3.4 Explain various ISO standards and the relevance of each type.
- 4.3.5 Compare BIS standards with ISO standard
- 4.3.6 Differentiate the merits and demerits of different quality management systems.

COURSE CONTENT

MODULE - I

Introduction to construction projects: – Types of construction projects – Elements of construction project – Overview of construction industry – Importance of construction projects – Functions of construction management – Planning and its importance – Details to be collected during planning and preparation of detailed project report - Scheduling – Organizing – Directing – Controlling – Increasing productivity.

Different stages in construction project: – Idea formulation – Investigation - Feasibility study/Report – Project implementation - Types of estimate – Rough cost estimate and detailed estimate – Financial management – cash flow - Budget – Seeking budget provision – Bills of appropriation – AS and TS.

Organizational structure of PWD/PSU: – Duties and responsibilities of Overseer, AE, AEE, EE, SE and CE. Types Establishment – Regular or permanent establishment – Work charged establishment –CLR and NMR workers.

Project management tools: – Bar chart – Network models – CPM – Project duration – EPO – LPO – EST-EFT – LST – LFT - Total float – Free float – Independent float – PERT – Calculation of expected time - Slack time – Comparison between Bar chart, CPM and PERT. Project crashing – Information about project management software - Resource leveling and resource smoothing - Time cost trade off - Job lay out – Modern housekeeping principles - Work study - Time and motion study.

MODULE - II

Tender: – Objectives of tendering - Tender notice – Details to be included in a tender notice – EMD – Tender documents – Types of tender – Procedure for opening tender - Tender tabulation – Firm period – Negotiations – Selection of contractor

Contract: – conditions for validity of contract - Types of contract – Item rate contract – Percentage contract – Cost plus percentage contract – Lump sum contract – Piece work system - Departmental execution of works - Comparison of different types of contract – Execution of agreement – Conditions of agreement - Work order.

Quality control: – Need and objectives of quality control – Role of specification, supervision, check lists, inspection and sampling & testing of materials in quality control.

Measurement of works: – Rules for taking measurement – M-book – Rules for recording in M-book – contractors acceptance of measurement – Arithmetic check – Preparation of bill – Types of bill – F&F bill – Part bill – Part & Final bill, Final bill – Recoveries from bill – Mode of payment – Hand receipt - Contractors ledger – Imprest money

MODULE - III

Human resources management: – Different sources of human resource- Education institution campus – internal recruitment – open market – from opponents – HR development - Recruitment – Selection – Appointment – Induction & training – In service training – Increasing productivity – motivation - Incentives - Labour welfare measures – Workmen compensation act – Trade unions – Role of trade unions.

Stores: – types of stores – T&P stores – material stores – Material handling - Store management – VED – ABC principles – Shelf life of materials - Issue of materials from stores – Stock register - Intent – Invoice – USR – MAS – Minimizing wastage - Survey report & writing off unserviceable materials – Surplus stores & safe custody – Stock verification - Procuring materials to stores – introduction to transportation problem – N-W corner method only - re-order level – EOQ – Taking delivery of goods from lorry parcel service or goods yard – LR/RR & Indemnity bond - Demurrage & wharfage.

Construction equipments (Brief introduction about their specific use only): – Earth moving equipments – Dozer, grader, power shovel, back hoe, JCB, ripper, drag line, clam shell etc. Hoisting equipments – construction lift, tower crane, gantry crane, jib crane, winch & pulley, chain block etc. Transporting vehicles – Tractor trailer, dumpers, tippers, trucks etc. Miscellaneous equipments like water pump, concrete mixing machine, batching plant, concrete pump, vibrators, compressors, pneumatic/electric driller, Jack hammer, Hydraulic/screw jack etc. Criterion for selection of equipment - Methods of procuring equipments – rental basis – Hire purchase – Outright purchase – Factors to be considered while selecting equipment.

MODULE - IV

Construction safety: – Basic principles of safety – Major causes of accidents at project site – Effects of accidents – Safety practices at construction site – Precautions in handling hazardous materials – Occupational hazard – Role of supervisor/ Engineer in ensuring safety at construction site – Safety legislations.

Entrepreneurship: – Factors promoting entrepreneurship – The role and expectations about an entrepreneur – Managerial v/s entrepreneurial style – Manager v/s Technocrat - organizations promoting entrepreneurship – Role of small business organizations in national growth. Requirements to become a licensed supervisor/surveyor/ supervisor.

Quality management: – Quality concepts – Basic TQM concepts – Elements of TQM - Quality standards – BIS v/s ISO – Various ISO standards related to construction – Merits and demerits of ISO standardization.

REFERENCES

1. NITTTTR, Madras : Construction Management ; Oxford University Press
2. Bhattachargee : Construction Management & Industrial Projects ; Khanna Publishers.
3. Jha : Principals of Construction management ; Pearson.
4. Mubarak : Construction project scheduling and control ; Wiley