

# CONSTRUCTION MANAGEMENT AND SAFETY

ENGINEERING - OCTOBER, 2018

## PART - A

1. free float : It is the amount of time by which the activity completion time can be delayed without interfering with the start of succeeding activities.
2. Earnest money Deposit :-  
While submitting the tender, a contractor will have to deposit an amount called Earnest money deposit. This amount is about 2-2.5% of estimated contract value of the project. This is collected in order to avoid the contractor from refusing the contract.
3. Classification of stores :-
  1. General stores
  2. Material charged to works
  3. Paints and machinery
  4. Small tools and plants.
4. Entrepreneur :- Entrepreneur is the one who innovates and assembles the other factors of production and starts an enterprise and who overcomes the risk.
5. Total Quality Management :-  
It is the process involving all levels in an organisation to promote never ending improvement in the effectiveness and efficiency of all elements of a business. The main aim of TQM is to achieve customer satisfaction with respect to quality, price & delivery.

## PART - B

### 1. feasibility Report:-

Before starting a new project, it is very important to convince the Government by submitting report giving the reasons for starting the project and necessity of project and also by educating the people to realise the need for National Development and the locality in particular. Such report sent for the Acceptance of the proposal in Principle by the complete administrative Authority is termed as feasible Report.

It consists of:

- 1) History of the proposal for the work in brief.
- 2) Necessity for the proposed work giving the reasons for the Satisfaction of the administrative Authorities who are competent to accept the necessity and sanction the funds.
- 3) Topography of the site, Nature of soil, Aspect and prospect consideration with regard to natural surroundings.
- 4) Cost and Returns expected cost-benefit Ratio.
- 5) Cost and Returns expected
- 6) Water Supply sources, Availability, possibilities of improvement
- 7) Total Approximate cost
- 8) Approximate to complete the project.

### 2. Project Report:-

Every project Report should accompany a estimate giving the various features of work. The report should be prepared so that one can understand the complete picture of the project. The report will differ according to the nature of work and should be written to suit the concerned project.

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE - OCTOBER, 2018  
CONSTRUCTION MANAGEMENT AND SAFETY ENGINEERING

[Time : 3 hours

(Maximum marks : 100)

PART - A

(Maximum marks : 10)

Marks

I Answer all questions in one or two sentences. Each question carries 2 marks.

1. What is meant by free float ?
2. What is earnest money deposit ?
3. List out classification of stores.
4. Define the term Entrepreneur.
5. Define total quality Management.

(5×2 = 10)

PART - B

(Maximum marks : 30)

II Answer any five of the following questions. Each question carries 6 marks.

1. Differentiate between feasibility report and project report.
2. What are the limitations of Bar chart ?
3. List out the contract system in construction works.
4. What are the advantages of Lump-sum contract ?
5. List out any six objectives of Human Resources Management.
6. List any six factors that may be considered before selecting the construction equipment.
7. What are the expectations of an entrepreneur ?

(5×6 = 30)

PART - C

(Maximum marks : 60)

(Answer one full question from each unit. Each full question carries 15 marks.)

UNIT - I

III (a) What are the factors considered in preliminary planning ?

5

(b) A project has nine activities; the expected time of each activity is as follows :

Activity	: 1-2	2-3	2-4	3-4	3-5	4-5	5-6	3-6	4-6
Expected time :	3	3	2	0	3	7	6	2	5

(i) Draw the programme network.

(ii) Identify critical path.

(iii) Find duration of project.

10

Or

[P.T.

- IV (a) Draw the diagrams, representing the following logic for CPM.
- (i) Operation B can be begin only after operation A is completed.
  - (ii) Operation B & C can start only after A is over.
  - (iii) Operation C can begin only after operation A & B over.
  - (iv) Neither operation C & D can begin until both A & B are completed but C can be started independent of D or vice versa.
- (b) Comparison between CPM and PERT.

UNIT — II

- V (a) What are the details must contain contract document ?
- (b) Explain general instructions to be observed in recording measurements.

OR

- VI (a) List advantages of Lump-sum contract.
- (b) Explain clearly the rules to be followed bill maintaining imprest account.

UNIT — III

- VII (a) What is meant by Demurrage and Warfage ?
- (b) Write short notes on :
- (i) Indent
  - (ii) invoice

OR

- VIII (a) List any seven applications of Drag line.
- (b) Explain batching plant and advantages of ready mix plant.

UNIT — IV

- IX (a) What are the general principles of safety in construction ?
- (b) What are the primary factors which can make a successful entrepreneur ?

OR

- X (a) What are the major causes of accidents at project site ?
- (b) State elements of Total Quality Management (TQM)

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(2)  
The report is usually given at the beginning of the estimate followed by layout plan designs and calculations, general & detailed specifications, analysis of rate etc. The plans and detailed drawings are enclosed at the end.

Report should cover the following points:-

- (1) History with reference to the proposal of the project in brief.
- (2) Object, necessity and utility of the project
- (3) Nature of soil, subsoil conditions, topography, orientation etc
- (4) Climate condition of the locality.
- (5) Required equipment to carry out the work and period of usage.
- (6) Approach roads position of existing roads and availability of other facilities.
- (7) Labour available & their skills
- (8) Cost benefit Ratio
- (9) Availability of construction materials, their location.
- (10) Labour Amenities, temporary accommodation for staff.

### (2) Limitations of Bar chart

- (1) The sequence of activities is not clearly defined
- (2) Various Activities are interdependent
- (3) Non-control on progress of the work.
- (4) Uncertainties.
- (5) Interdependence of tasks makes it necessary to pay equal attention to all items of work.
- (6) The chart is suitable only for simple and small job.

List out the contract systems in construction works.

- (3) 1) Lumpsum contract
- 2) Item rate contract
- 3) Lumpsum & item rate contract
- (4) Percentage rate contract
- (5) Cost plus percentage contract
- (6) fixed fee contract
- (7) Negotiated contract
- (8) Piecework agreement -

#### 4) Advantages of lumpsum contract

- (1) Due to competition among contractors, the contractor accepts the contract with less profit
- (2) As the total cost of the ~~work~~ work is known before hand, the department can arrange the funds in time
- (3) As the profit is directly depends on the time of completion, contractor tries to complete the work as early as possible
- (4) The materials used in the temporary works during construction are relieved earlier resulting in their effective use in other works also.

#### 5) Objectives of HRM.

- 1) To help the organization to reach its goals
- (2) To ensure effective utilization & maximum development of human Resources.
- (3) To respect for human beings
- (4) To achieve and maintain high morale among employees
- (5) To develop and maintain a quality of work life
- (6) To enhance employees capabilities to perform the present job.

#### 6) factors to be considered before selecting the Construction Equipment.

- (1) Whether to procure new or old equipment
- (2) Operating Expenses
- (3) Out turn
- (4) Contract time and project time
- (5) field operating conditions.
- (6) Weather.

7) Expectations of an Entrepreneur. (3)

- (1) He should know the actual need of the society for products or services.
- (2) He should take up the venture with the spirit of service to the society
- (3) He should work hard to improve through better management of resource finance.
- (4) He should always be prepared to face the competitors.
- (5) He should have good knowledge of business.
- (6) He should plan to promote more labour intake.

PART - C

CINQ-1

(a) Details included in contract document

1. Rates of each item of work including materials, labour, transport
2. Manner of payment to the contractor.
3. Time of completion for the work
4. Delay & extension of time
5. Penalty for poor quality work and delay
6. Compensation to the owner for delay.
7. Liquidated damages
8. Engaging other agency at work
9. Natural disasters
10. Price escalation.

- (b) Recording measurements :-
- (1) Measurements should be made in ink. No eraser is allowed. If mistakes are made, it should be corrected by striking out.
  - (2) Measurements should be neatly & directly entered to the measurement book at the site of work.
  - (3) Signature of the contractor should be obtained at the site of work at the time of measurement.
  - (4) Measurements should be recorded continuously. Any page left blank should be cancelled by a diagonal line & should be attested.
  - (5) The person recording measurement shall put his signature with date.
  - (6) When any measurement is cancelled, it must be supported by the dated sign of officer.

OR

Advantages of Lumpsum Contract

Refer Part-B, question No: 4

- (b) Rules to be followed bill maintaining Imprest Account
- (1) Payment should be entered daily as & when they are made
  - (2) Account should be balanced from time to time and few days before the monthly closing of the cashbook of the disbursing officer from whom the imprest is obtained.
  - (3) The Account should be supported by vouchers for the payment
  - (4) The Account should be rendered to the receiving officer whenever the imprest is to be received.
  - (5) The right hand of the form should be cut and sent to the disbursing officer & counterfoil retained by the imprest holder.

(a)

Demurrage :-  
Demurrage charges are levied for detaining a wagon beyond the period allowed for its unloading usually six hours.

Wharfage charges :-

It is a penalty for the delay in removing goods keeping the railway space occupied beyond certain permissible period 24 to 48 hours are allowed from the midnight of the day of receipt of articles by the railway. Authorities for the removal of articles beyond which wharfage is imposed.

(b)

Indent :-  
(1) Materials should be issued from stock only on receipt of an indent form (F), signed by the Divisional (or) sub-divisional officer.

They contain date, particulars of the stores required, such as quantity, description, order, signature, space for initial of storekeeper & signature of person receiving the material. The storekeeper should scrutinize the indent and endorse in writing about the compliance to full/in part or non compliance due to want of stock (or) other reasons.

(ii) Invoice

An invoice is prepared by the storekeeper when a material is issued, simultaneously making an entry in the stock register. The invoice should be sent to the indenting officer for acknowledging receipt of the item & then treated as a voucher for entry in the stock register.

(OR)

VIII

(a) List any 7 Applications of Dragline.

- 1) Road excavation
- 2) Pile Driving
- 3) Construction of ports, harbor etc
- 4) Surface mining
- 5) Deep down Excavation
- 6) Under water Excavation.
- 7) Pond & canal Dredging.

(b) Batching plant :-

- Used when large quantities of concrete are required
- Storage bins of adequate capacities are also installed
- Plant location must be easily accessible

Batching plant comprises of :-

1. Storage bins
2. Weigh hoppers
3. central plant Mixer

Advantages of Ready Mix plant :-

1. Assured & uniform qty of concrete
2. Speedier construction
3. Need for ordering & storing cement aggregates & sand on site is totally eliminated
4. Lower labour & supervisory costs
5. Cleaner working environment
6. Minimize wastage

ix(a) Principles of Construction Safety

- (1) Every large construction project should have a safety Dept. headed by a safety officer
- (2) It is necessary to include safety measures as a clause in the contract document
- (3) Previous safety Record of a contractor should be considered
- (4) Safety education & training is one of the most important aspects of construction industry
- (5) Govt. also needs to improve the safety measures by providing proper inspection.
- (6) safety measures should start at the planning & designing stage.

ix factors Promoting Entrepreneurship(b) political stability

- 2 Social prestige
- 3 Traditions in industry career
- 4 Education programme
- 5 Accuracy.
- 6 Time sense & foresight
- 7 Alertness
- 8 Honesty.
- 9 Ability to co-operate

(OR)

xCauses of Accidents(a) Planning, Designing & Organization

- (a) Planning defects & defects in designing
- (b) Unsuitable time limits
- (c) Selecting incompetent contractors.
- (d) Defective supervision of work
- (e) No co-ordination b/w different trades.

## 2. Execution work.

- (1) Defects in construction materials
- (2) Selecting unsuitable materials
- (3) Improper processing of materials

### (3) Machinery & Equipment :-

- (1) Lack of suitable equipment
- (2) Defect in equipment & machinery
- (3) Lack of safety devices in using machines & equipment.

### (4) Management & conduct of work :-

1. Inadequate instruction from supervisor regarding the works.
2. Unskilled or untrained operatives.

### (5) Behaviour of workers

1. Carelessness
2. Not following the instructions
3. Negligence

## X

(b)

### Elements of TQM:-

- Customer Satisfaction
- Employee Involvement
- Morale of employees
- Quality control circles
- Higher profit
- Lower cost
- Quality control
- Quality of production
- Quality planning
- Quality improvement
- Quality implementation
- Leadership
- Customer Relationship management.
- Strategic Quality management.

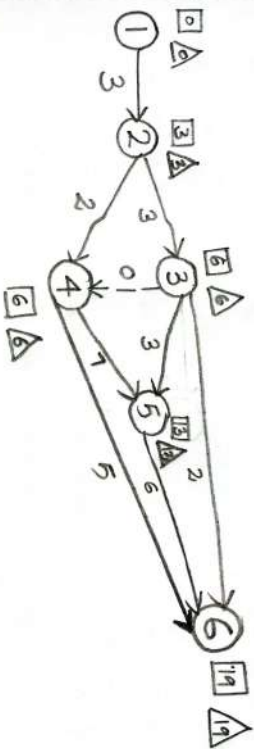
II  
(a)

Factors Considered In planning

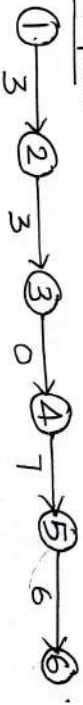
- 1) Topography
- 2) Geological conditions of site
- 3) Climate
- 4) Selection of proper materials
- 5) Time for using a particular equipment during construction
- 6) Collecting & storing of materials & machinery
- 7) Skills required as per specifications & quality.
- 8) Construction Method
- 9) Drainage facility
- 10) Progress of work.

III  
(b)

(i)

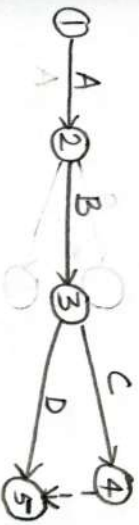


(ii) Critical path



(iii) Duration of the project :-  $3+3+0+7+6 = 19$  days -

IV  
(a)



IV  
(b)

Comparison between CPM & PERT

BASIS FOR COMPARISON	PERT	CPM
Meaning	PERT is a project management technique, used to manage uncertain activities of a project.	CPM is a statistical technique of project management that manages well defined activities of a project.
What is it?	A technique of planning and control of time.	A method to control cost and time.
Orientation	Event-oriented	Activity-oriented
Evolution	Evolved as Research & Development project	Evolved as Construction project
Model	Probabilistic Model	Deterministic Model
Focuses on	Time	Time-cost trade-off
Estimates	Three time estimates	One time estimate
Appropriate for	High precision time estimate	Reasonable time estimate
Management of	Unpredictable Activities	Predictable activities
Nature of jobs	Non-repetitive nature	Repetitive nature
Critical and Non-critical activities	No differentiation	Differentiated
Suitable for	Research and Development Project	Non-research projects like civil construction, ship building etc.
Crashing concept	Not applicable	Applicable