

Code : 101602

B.Tech 6th Semester Exam., 2022

( New Course )

CONSTRUCTION ENGINEERING AND  
MANAGEMENT

Time : 3 hours

Full Marks : 70

## Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.
- (v) Assume any data not given.

1. Choose the correct answer of the following  
(any seven) : 2×7=14

- (a) For establishing and maintaining priorities among the various jobs of a project, the technique is known as
- (i) critical ratio scheduling
  - (ii) event flow scheduling technique
  - (iii) slotting technique for scheduling
  - (iv) short interval scheduling

- (b) In case of CPM, the performance of a specific task is known as
- (i) dummy
  - (ii) event
  - (iii) contract
  - (iv) activity
- (c) Military organization is also called as
- (i) line organization
  - (ii) line and staff organization
  - (iii) functional organization
  - (iv) None of the above
- (d) Which of the following is incorrect statement?
- (i) The activity is the time consuming part of a project.
  - (ii) The beginning and end of a job, are called events.
  - (iii) The activity which consumes maximum time, is called a node.
  - (iv) Logically and sequentially connected activities and events form a network.
- (e) Without affecting the start of succeeding activities, the time by which activity completion time can be delayed, is known as
- (i) duration
  - (ii) interfering float
  - (iii) free float
  - (iv) total float

- (f) In bar chart, the various activities of a project, are shown by
- (i) vertical lines
  - ~~(ii)~~ horizontal lines
  - (iii) dots
  - (iv) crosses
- (g) The time which is responsible for least possible construction cost of an activity, is
- (i) normal time
  - (ii) crash time
  - ~~(iii)~~ standard time
  - ~~(iv)~~ slow time
- (h) If an activity has its optimistic, most likely and pessimistic times as 2, 3 and 7 respectively, then its expected time and variance are respectively
- (i) 3.5 and (5/6)
  - (ii) 5 and (25/36)
  - ~~(iii)~~ 3.5 and (25/36)
  - (iv) 4 and (5/6)
- (i) A critical ratio scheduling
- (i) determines the status of each activity
  - (ii) adjusts automatically changes in activity progress
  - (iii) is a dynamic system
  - ~~(iv)~~ None of the above

- (j) A machine costs ₹ 20,000 and its useful life is 8 years. The money is borrowed at 8% interest per annum. The capital recovery factor at 8% interest per annum for 8 years is 0.174. The annual equipment cost of the machine will be
- (i) ₹ 1,740
  - ~~(ii)~~ ₹ 3,480
  - (iii) ₹ 5,220
  - (iv) ₹ 6,960
2. Assess the present constructional infrastructure in India. Give the remedial measures keeping in mind the economic feasibility. Categorize the different construction works. Explain the different criteria of selection of site for a project. 14
3. What is critical path method? Prepare the network as per the data given in the Table 1 and compute in a table their early start, early finish, late start and late finish times. Determine the critical path and find the total float and free float for all the activities : 14

Table 1

Activity	Duration (days)	Activity	Duration (days)
1-2	8	4-7	0
1-3	10	5-6	4
1-4	5	5-7	3
2-7	6	5-8	6
3-4	3	6-8	5
4-5	7	7-8	5

4. What do you mean by PERT and what is its significance? As per the network shown in Fig.1, find the expected time for each of the paths. Also find the critical path as well as the expected time for the project completion : 14

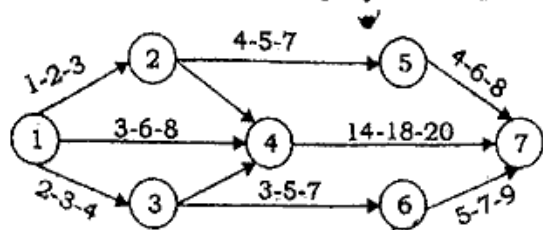


Fig.1

5. Write the factors to be considered for precast concrete construction. What do you mean by scaffolding? A project takes 20 days along the critical path and has a standard deviation of 4 days. What is the probability of completing the project within (a) 20 days, (b) 24 days and (c) 18 days? 14

6. Compare the characteristics and application of the different types of earth excavating equipment. Estimate the output of a bulldozer for the following operating conditions : 14

- (a) Material—Sandy loam top soil  
(b) Swell—25%

- (c) Haul distance—45 m  
(d) Mould board size—3.0 m long, 1.0 m high  
(e) Rated mould board capacity—3 cu.m loose volume  
(f) Operating factor—50 min/hr  
(g) Probable round trip time—1.87 min

7. Explain the application of BIM in project management. What are the safety measures to be considered in the construction site? A target date of completion is to be forecast based on the following information :

Item A takes 7 weeks for completion; Item B takes 5 weeks; Item C depends on the completion of both A and B, and requires 3 weeks; Item D follow up of Item C and requires 2 weeks.

Prepare a Gantt chart for scheduling the completion date. 14

8. Explain the importance of organization in construction activities. What are the methods of scheduling?

For the construction of a guesthouse, certain activities are to be performed as shown in Table 2. Activities 2 and 3 can be performed simultaneously and can start only

when Activity 1 is completed. Activity 4 can start only after Activity 2 ends. Activity 5 cannot begin until activities 2 and 3 are completed. Activity 6 can start only after Activities 4 and 5 are completed. Activity 7 is the last activity and this can commence only after the completion of Activity 5 :

- (a) Prepare a bar chart for the project.  
 (b) What is the total time taken for the completion of the project?

14

Table 2

Activity No.	Duration (in weeks)
1	2
2	3
3	5
4	4
5	2
6	3
7	5

9. What is called liquidated damage? What do you mean by direct cost and indirect cost? The following Table 3 gives the data for the duration and costs of each activity of a project network shown in Fig. 2. The indirect cost of the project is ₹3,000/week. Determine the optimum duration of project

and the corresponding minimum cost. Draw the time scaled version of the network :

Table 3

Activity	Normal Duration (week)	Normal Cost (₹)	Crash Duration (week)	Crash Cost (₹)
1-2	6	7,000	3	14,500
1-3	8	4,000	5	8,500
2-3	4	6,000	1	9,000
2-4	5	8,000	3	15,000
3-4	5	5,000	3	11,000

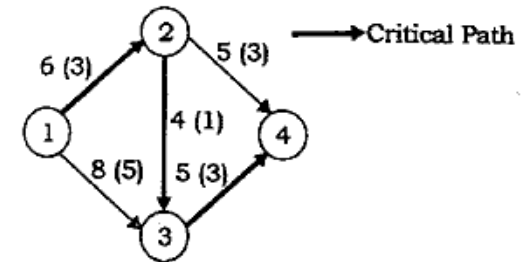


Fig. 2