BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
SECOND SEMESTER 2022 – 2023
CONSTRUCTION PLANNING & TECHNOLOGY – MID-SEM (REGULAR)

Course No: CE F242   **Date: 16-03-2023 [9:00 AM start]**
Duration: 90 Minutes (Closed book)   **Max. Marks: 70**

I: Fill up the blanks [10 x 1 = 10]

1) NBC stands for _____

2) There is an advantage in using "skip numbering" concept while numbering events in a network (True/False).

3) The nodes are probabilistic in nature in both PERT and GERT network (True/False)

4) FSN stands for _____ in the context of inventory management.

5) Straight line method uses the instantaneous book value for the computation of annual depreciation (True/False)

6) In PERT network representation standard deviation and variance are affected by the most likely time estimate (True/False)

7) The distribution curve for the time taken to complete the entire project in general resembles a _____

8) Cost over-run indicates that actual cost of work performed is higher than budgeted cost of work performed (True/False)

9) Zero NPV indicates that the investment and earnings cancel each other (True/False)

10) Crashing of the activity always increases the total cost (True/False)

II: Short answers [10 x 2 = 20]

1) Briefly mention examples for time-bound project, safety bound project and cost-bound project.

2) What is the difference between direct cost control and direct cost reduction?

3) What is the concept behind the switch over from double declining method to straight line method?

4) What factors affect selection of particular equipment? Is it advantageous to get the equipment on rental basis?

5) Explain with an example the importance of free float.

6) Briefly explain earned value and planned value.

7) What is the difference between resource smoothing and resource leveling?

8) What is NPV and briefly highlight its importance?

9) What are the pros and cons of wheeled and crawled excavator?

10) Standard cost does not include wastage and hence impractical – Discuss this statement.

III: Long Answers [40 Marks]

1) The following is the list of activity pertaining to construction of house. The houses are identical in nature and there are 5 similar houses to be constructed. [15]

Activity	Quantity for one house	Productivity assumed	No. of workers to be utilized
Earthwork excavation	400 m^3	3 MH/m^3	20
Preparation of formwork for foundation	100 m^2 of formwork	15 MH/ m^2	15
	3 tonnes of reinforcement	60 MH/tonne	
Foundation concrete	350 m^3	3 MH/m^3	20
Raising of superstructure (Columns)	150 m^3	5 MH/ m^3	10
Roof slab concreting	100 m^3	3 MH/m^3	12
Construction of infill wall panels	400 m	5 MH/m	20

Assume that workers will work for 10 hours a day. Buffer can be taken as **1 day** and the type of buffer can be assumed in line with the speed of the construction activity. Assume all activities are going to happen in sequence.

Determine the following estimates using **Line of Balance (LoB)** technique.
a) Start day of all the activities (corresponding to house 1 and house 5)
b) What is the total duration of the project?

2) The following activities typically represent the construction of one-storey Reinforced Cement Concrete (RCC) building. Draw the network and calculate EST, LST, EFT, LFT for the following data for only the normal duration. [15]

Activity	Normal Duration (in weeks)	Direct Cost (in Rs.)	Crash Duration (in weeks)	Crash Cost (in Rs.)
1-2	5	10 Lakhs	3	15 Lakhs
1-3	3	6 Lakhs	2	8 Lakhs
2-4	10	25 Lakhs	6	40 Lakhs
3-4	15	30 Lakhs	14	35 Lakhs
3-5	7	15 Lakhs	5	20 Lakhs
4-6	3	5 Lakhs	2	10 Lakhs
5-6	25	40 Lakhs	20	60 Lakhs
6-7	15	20 Lakhs	10	30 Lakhs

The indirect cost of the project is estimated to be Rs. 5 Lakhs/week.

Calculate the total project cost for the following cases.
a) Without any crashing
b) If we need to reduce the project duration by 5 weeks, which activities need to be crashed and accordingly calculate the total project cost.

3) Consider the data reported below at the end of the 20th week of the Hospital Building project (five storied), which is scheduled for completion at the end of 50th week. Determine the earned value, planned value and CPI. Assuming that the remaining work shall progress at prevailing trend, determine the cost forecast at completion. [10]

Name of the activity	Planned progress (%)	Actual progress (%)	BAC (in lakhs)	ACWP (in lakhs)
Completion of structural design & drawings	100	100	10	15
Identification of contractors	100	100	5	3
Site excavation	100	100	25	32
Construction of all storeys (including basement)	70	50	150	90
Installation of all equipments including fire extinguishers	50	40	75	30
Special finish of all flooring in line with hospital requirements	40	15	40	8
Installation and commissioning of elevators	40	20	20	5
Finalization of electricity supply	20	15	5	0.5

Note: BAC = Budgeted cost at completion; ACWP = Actual cost of work performed

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