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National Institute of Technology Hamirpur (H.P.)

B.Tech 5th Semester, Academic Session 2023-24 (July-December)

End Term Examination

Subject: CPM and PERT (CE-306)

Note: Attempt all questions.

Assume data if required.

Supplementary data is provided at the end of the question paper.

Full marks: 50

Time: 3.0 hours

Question 1. Define activity. Mentioned the importance of dummy activity. Describe Activity-on-arrow and Activity-on-Node of a network. [3]

Question 2. Graphically describe the break event analysis of a project. [2]

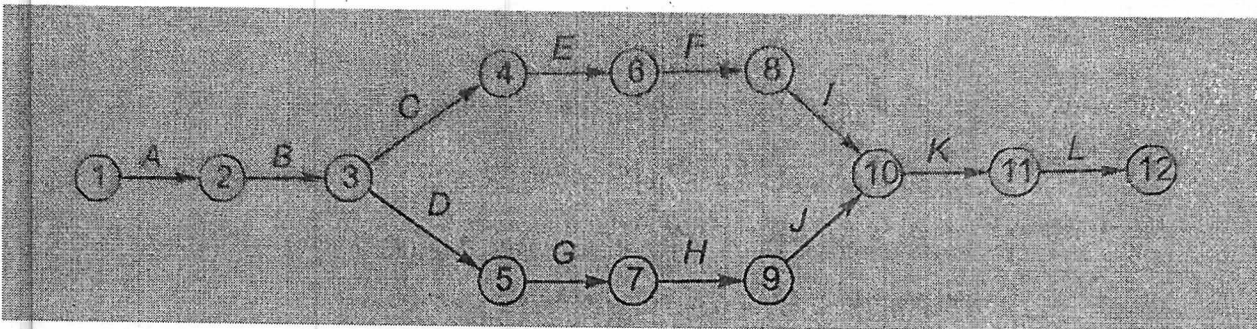
Question 3. Graphically describe the relation between the total cost, direct cost and indirect cost. [2]

Question 4. Describe crash cost, crash time, normal cost, and normal time. [2]

Question 5. For construction projects, the mean and standard deviation of the completion time are 200 days and 6.1 days, respectively. Assume normal distribution and use the value of standard normal deviate, $z=1.64$ for the 95% confidence level. Calculate the maximum time required (in days) for the completion of the project. [2]

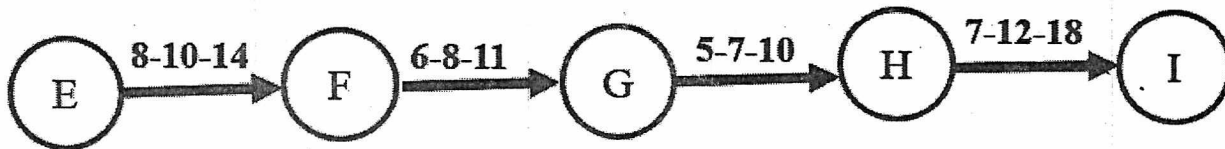
Question 6. A construction project consists of twelve activities. The estimated duration (in days) required to complete each of the activities along with the corresponding network diagram is shown below. [2]

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Duration	1	7	30	30	25	7	25	7	7	7	3	1



Calculate the total floats (in days) for the activities 5-7 and 11-12 for the project.

Question 7. The Optimistic time (O), Most likely time (M) and Pessimistic Time (p) (in days) of the activities in the critical path are given below in the format O-M-P.



Calculate the expected completion time (in days) of the project. [2]

Question 8. Calculate the cost slope of the project presented in the table below. **Please do not change the order in which activities are listed in the table.** [5]

Activity	Normal Duration (days)	Crash Duration (days)	Normal cost (INR)	Crash cost (INR)	Cost Slope
P	6	4	15000	25000	
Q	5	2	6000	12000	
R	5	3	8000	9500	
S	6	3	7000	10000	
T	3	2	6000	9000	
U	2	1	4000	6000	
V	4	2	20000	28000	

Question 9. The project consists of eight activities. The time duration (D (i, j) in days) of the various activities are presented in the Table below. Note, Activity D depends on activity B. Activity from event (node) 3 to 4 does not consume time. Draw the network for the following project and indicate the event times, critical path, activities early/ latest start / finish times and three types of floats. Mention EST, activity, EFT, LST, LFT in the network. [10]

Please do not change the order in which activities are listed in the table.

Activity	Duration D(i,j)	EST	EFT	LST	LFT	Total float	Free float	Independent float
A (1, 2)	3							
B (1, 3)	16							
C (2, 4)	5							
D (4, 6)	8							
E (3, 5)	4							
F (5, 6)	4							
G (6, 7)	17							
H (5, 7)	11							