GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2174002   **Date:21/01/2021**
Subject Name:Construction Planning & Management
Time:10:30 AM TO 12:30 PM   **Total Marks: 56**

Instructions:
1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

			MARKS
Q.1	**(a)**	What are the construction management functions during the construction phase of a project?	**03**
	(b)	Explain in brief: various life cycle phases of a typical construction project.	**04**
	(c)	Explain the Project Work Breakdown Structure (WBS) in detail. Also draw a typical WBS for a 'Shopping Mall Construction Project'.	**07**
Q.2	**(a)**	Explain various types of activity Floats in network diagram. How they are evaluated?	**03**
	(b)	Draw a network diagram (AOA) for the following activities in a project.	**04**

Activities	IPA	Labors/day	Days(duration
A	--	5	3
B	--	8	3
C	A	7	5
D	B	6	2
E	C, D	5	2

	(c)	Draw a network (AOA) from the following activities and find critical path and duration of project.	**07**

| Activities	Duration (Days)	Activities	Duration (Days)
1-2	5	5-9	3
1-3	8	6-10	5
2-4	6	7-10	4
2-5	4	8-11	9
2-6	4	9-12	2
3-7	5	10-12	4
3-8	3	11-13	1
4-9	1	12-13	1

Q.3	**(a)**	Briefly outline the concept of various management techniques/tools for scheduling construction projects. Mention the suitability of each.	**04**
	(b)	Enlist the major potential risk areas of a Construction site.	**03**
	(c)	Convert the following CPM network in to AON network.	**07**
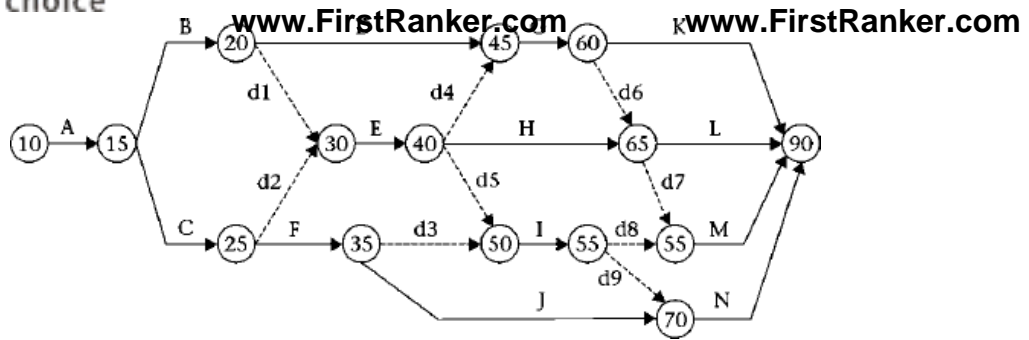
Q.4 **(a)** What are the limitations of the bar chart? **03**

(b) Prepare a Health and Safety plan (HS plan) for a typical construction site **04** for a contractor to bid in pre-tendering process.

(c) Draw precedence diagram for the following data and find out critical path **07** and various floats. Lag/Lead relations are for a particular logical relation is given in brackets. Where ever explicit relations are not mentioned, it is F-S relations with zero lag/lead.

Activity	A	B	C	D	E	F	G	H
Predecessor	-	A[FS(1)]	B	B[SS(2)]	D	D,E	E	F[FF(4)],G
Duration	4	6	5	6	3	4	3	5

Q.5 **(a)** Enlist the cost associated for establishment of a typical construction site. **03**

(b) How resource levelling and resource allocation are different? Enlist the **04** general rules to be followed in resource levelling problems.

(c) A network is given below for a project. At the end of 10 days, following **07** information are available from site on the project status. Draw an updated network diagram using status report:
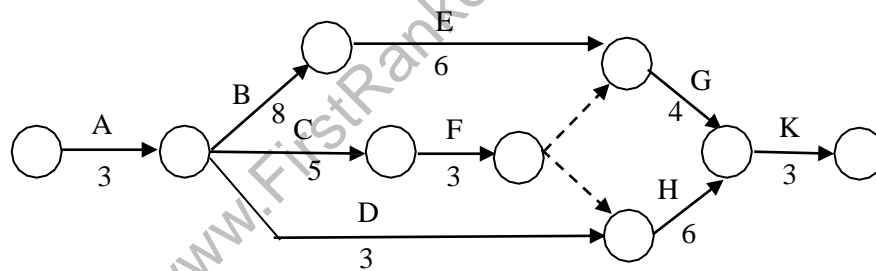
- Activity D takes 6 days to finish.
- Activity F takes 5 more days to complete.
- It is expected that it will take total 15 days to finish activity B.
- Activity H cannot start until day 17 because of the delay of material.

Q.6 **(a)** What are the typical responsibilities of a contractor at a construction site? **03**

(b) In the Q.2(b) network, allocate the resources based on the early start and **04** late finish times of the network.

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(c) A project consist of 8 activities of the following time estimates. Find the probability that the project will be completed in 30 weeks or less. **07**

Activity	IPA	Most Optimistic time	Most likely time	Pessimistic time
A	--	2	4	12
B	--	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B,C	9	9	9
G	D	3	3.5	7
H	E,F,G	5	5	5

Q.7 **(a)** Explain the following terms: **03**
1. Actual cost of the work performed (ACWP)
2. Budgeted cost of the work scheduled (BCWS)
3. Budgeted cost of the work performed (BCWP)

(b) Explain central limit theorem and how it is used in PERT problems. **04**

(c) PERT Data for a project is given. Calculate the completion time of project with 50% probability. **07**

i	j	Act	a	M	b
5	10	A	2.00	4.00	6.50
5	15	B	6.00	7.00	7.50
5	30	C	1.00	2.00	5.50
10	20	Y	2.50	4.50	5.50
10	25	U	5.00	6.00	7.00
15	30	I	3.00	4.00	7.50
20	35	O	2.50	5.50	8.00
25	35	P	2.00	3.00	5.00
25	40	L	3.00	4.00	4.00
30	45	K	1.00	2.00	3.50
35	50	J	5.00	6.50	8.00
40	50	H	4.00	5.00	6.50
45	55	G	2.00	3.00	5.00
50	60	F	6.50	7.50	9.50
55	60	D	3.50	5.00	7.00
60	65	S	3.00	4.00	4.50

Q.8 **(a)** Explain the following in terms of Variance analysis: **03**
1. Cost Variance
2. % Cost Overrun / Underrun
3. % Time Overrun

(b) One project consist of 5 units requiring 7 activities. Using line of balance method, schedule the project. (Consider no of gang as one for all the activities.) **04**

Activity	Duration (days)
A	3
B	2
C	4
D	3
E	2
F	3
G	1

(c) The table given gives the data about duration and costs of various activity of network shown in figure. **07**

Activity	Normal Duration (Weeks)	Normal cost (Rs.)	Crash Duration (Weeks)	Crash Cost (Rs.)
1-2	5	4000	3	12000
2-3	6	3000	3	7500
2-4	8	3600	6	6000
3-4	5	5000	3	10000

The project overhead cost are Rs. 1500 per week. Find the optimum duration and the cost associated with it. Also, show the least cost and duration graphically.

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Normal Deviate −	Probability (%)	Normal Deviate +	Probability (%)
0	50.0	0	50.0
− 0.1	46.0	+ 0.1	54.0
− 0.2	42.1	+ 0.2	57.9
− 0.3	38.2	+ 0.3	61.8
− 0.4	34.5	+ 0.4	65.5
− 0.5	30.8	+ 0.5	69.2
− 0.6	27.4	+ 0.6	72.6
− 0.7	24.2	+ 0.7	75.5
− 0.8	21.2	+ 0.8	78.8
− 0.9	18.4	+ 0.9	81.6
− 1.0	15.9	+ 1.0	84.1
− 1.1	13.6	+ 1.1	86.4
− 1.2	11.5	+ 1.2	88.5
− 1.3	9.7	+ 1.3	90.3
− 1.4	8.1	+ 1.4	91.3
− 1.5	6.7	+ 1.5	93.3
− 1.6	5.5	+ 1.6	94.5
− 1.7	4.5	+ 1.7	95.5
− 1.8	3.6	+ 1.8	96.4
− 1.9	2.9	+ 1.9	97.1
− 2.0	2.3	+ 2.0	97.7
− 2.1	1.8	+ 2.1	98.2
− 2.2	1.4	+ 2.2	98.6
− 2.3	1.1	+ 2.3	98.9
− 2.4	0.8	+ 2.4	99.2
− 2.5	0.6	+ 2.5	99.4
− 2.6	0.5	+ 2.6	99.5
− 2.7	0.3	+ 2.7	99.7
− 2.8	0.3	+ 2.8	99.7
− 2.9	0.2	+ 2.9	99.8
− 3.0	0.1	+ 3.0	99.9