

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

Subject Code: 2174002

Date: 26/11/2019

Subject Name: Construction Planning & Management

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1**
- (a) Explain major problems currently faced by the Construction industry in India. **03**
 - (b) What are the functions of Construction Project Management? **04**
 - (c) Write down the cost associated with site establishment of a construction project. **03**
 - (d) What are the major risks to be addressed at construction site? **04**
- Q.2**
- (a) What is the difference between Resource Allocation and Resource Levelling of a project? **03**
 - (b) Total project consist of 8 activities as follows: **04**

Activity	A	B	C	D	E	F	G	H
Duration(weeks)	2	4	2	4	6	4	5	4

The precedence relationships are as follows:

- A & B can be performed in parallel.
- C & D cannot start until A is completed.
- E cannot start until half the work of activity C is complete.
- F can start only after activity D is complete.
- G succeeds C
- H is last activity which should succeed E

Prepare a linked bar chart for the project also find out the total time of completion of project.

- (c) Draw AON network diagram for the activities given below. Also find event times and various Floats of each activity **07**

Activity	Duration (days)	IPA
A	3	--
B	10	A
C	7	A
D	6	B
E	5	B,C
F	4	C
G	2	D
H	4	D,E
I	10	E
J	6	E,F
K	4	G,H,I
L	2	H,I
M	1	J,L

- (c) Draw AON network diagram for the activities given below. Also find event times and various Floats of each activity

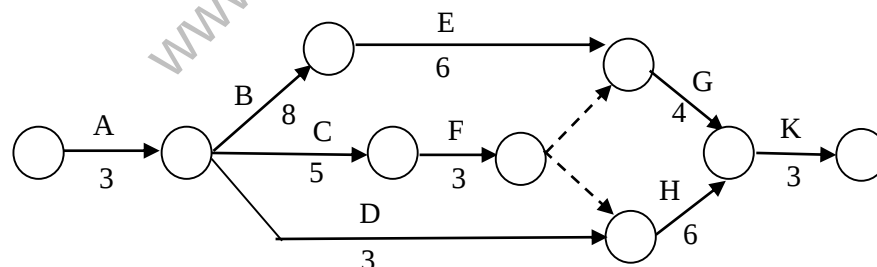
Activity	Duration (days)	IPA	Cost (Rs.)
A	2	--	2000
B	7	A	5000
C	10	A	7000
D	5	A	6000
E	4	B	8000
F	4	B,C	3000
G	3	C	2000
H	6	C,D	6000
I	3	D	5500
J	6	E,F,G	8000
K	8	F,G,H	7000
L	5	H,I	10000
M	3	K,L	9000

- Q.3** (a) Enlist the different levels of Work Breakdown Structure. **03**
 (b) Draw Work Breakdown Structure for a 'Township Planning and Construction'. **04**
 (c) Draw AOA network diagram for the following activities. **07**

Activity	IPA	Activity	IPA
A	--	H	C,D
B	A	I	D
C	A	J	E,F,G
D	A	K	F,G,H
E	B	L	H,I
F	B,C	M	K,L
G	C		

OR

- Q.3** (a) What do you mean by Dummy activity? When it is used? **03**
 (b) Draw Work Breakdown Structure for a 'Construction of a Culvert'. **04**
 (c) A network is given below for a project. At the end of 10 days, following information are available from site on the project status. Draw an updated network diagram using status report: **07**



- 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.4 (a) The time estimates for three activities A,B and C are as follows: **03**

	Optimistic Time	Most Likely Time	Pessimistic Time
A	10	12	14
B	6	8	12
C	5	10	12

Determine expected time and variance for each activity. Which activity has more reliable time estimates?

(b) Enumerate the steps taken in scheduling with LOB and how it is advantageous in construction field? Explain briefly. **04**

(c) For the project data given in Q.2 (c) (or) calculate cash out flow requirement for first 20 days if the project is scheduled based on Late Finish of activities. (LF Schedule) **07**

OR

Q.4 (a) How % project progress, % cost overrun and % time overrun are calculated using variance analysis? **03**

(b) Explain the term 'Slack'. What is the meaning of Positive Slack, Zero Slack and Negative Slack. **04**

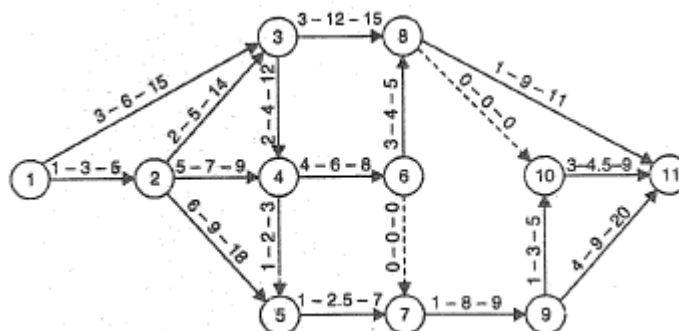
(c) For the project data given in Q.2 (c) (or) calculate cash out flow requirement for first 20 days if the project is scheduled based on early start of activities. (ES Schedule) **07**

Q.5 (a) Explain the method of time-cost optimization of project network. **03**

(b) A small building construction of 10 units involves 5 operations (A, B, C, D and E) in series with duration and other resource requirements are as given below. Using Line of Balance (LOB) concept, schedule the project. Use a minimum buffer of 1 week between operations. **04**

Operations	Duration (Weeks)	Labour (No. of gangs)	Operations	Duration (Weeks)	Labour (No. of gangs)
A	2	2	D	4	3
B	4	3	E	2	2
C	1	1			

(c) A construction company has an opportunity to submit a bid for a new apartment building. From the specification provided by the developer the PERT network with the three time estimates (in weeks) for each activity are shown in figure. **07**



Determine:

1. Critical path and its standard deviation.
2. Probability of completing the work in 38 weeks.

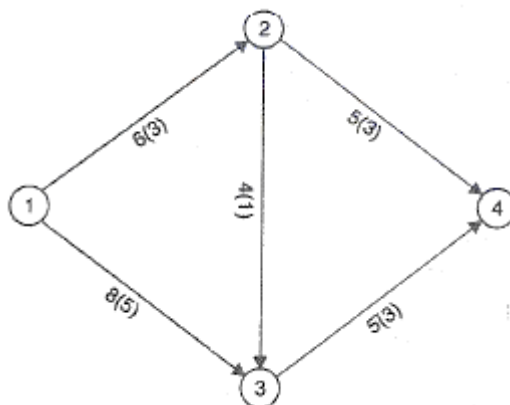
3. Completion time duration for which the company should bid to provide 95% probability of completing the project in time.

OR

- Q.5 (a)** Draw Precedence diagram for the following activities. Also find critical path and project completion time. **03**

Activity	Duration (days)	IPA	Relation type	Lag
A	3	--		--
B	5	A	SS	3
C	2	A	FS	--
D	6	B	FF	--
		C	FS	--

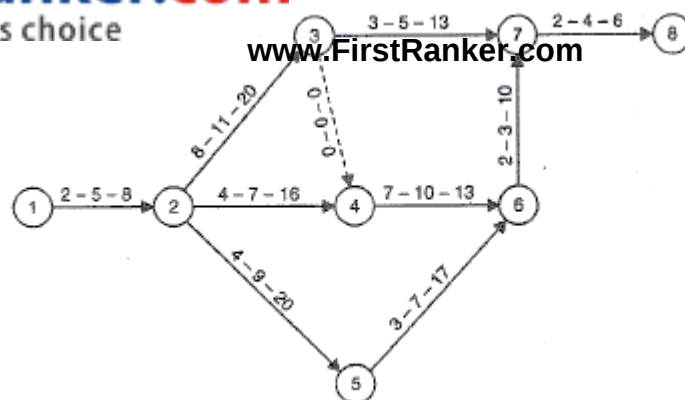
- (b)** Figure shows the network for a project, the data for the duration and cost of each activity are given in the table. Normal time and crash time (bracket) are also mentioned in the diagram. **04**



Activity	Normal duration (in weeks)	Normal cost (Rs.)	Crash duration (in weeks)	Crash cost (Rs.)
1-2	6	7000	3	14500
1-3	8	4000	5	8500
2-3	4	6000	1	9000
2-4	5	8000	3	15000
3-4	5	5000	3	11000

The direct cost of the project is Rs. 3000 per week. Determine the optimum duration of the project and corresponding minimum cost.

- (c)** Figure shows the network for a construction project, with the three time estimates of each activity marked. Determine, **07**
- Critical path and its standard deviation.
 - Probability of completion of the project in 40 days.
 - The duration that will provide 95% probability of its completion in time.



Normal Distribution Function

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
