

**Question #1** [10 points]

What are the shortcomings of Benefit-Cost Ratio Method?

**Question #2** [10 points]

When there is ambiguity in the contract and disputes arise, you may want to look for manifestations of intent in order to see the intent of the parties. List five common manifestations in the order of priority.

**Question #3 [50 points]**

Consider the precedence relationships given in the Table below.

Activity	Predecessors	Durations (weeks)
A	-	9
B	-	5
C	A	3
D	B	10
E	B	6
F	B	8
G	C, D, E	6
H	E	4
I	E, F	3
J	H, I	7
K	G	5
L	J, K	2

(a) Draw AOA (Activity-On-Arrow) diagram. [10 points]

(b) Draw AON (Activity-On-Node) diagram and calculate ES, EF, LS, LF, TF, and FF. Tabulate your answers. Also identify the CPs (Critical Paths). [20 points]

- (c) Lead-Lag Relationships: Suppose some lead-lag relationships were added to the original relationships given in the table above. Draw the updated AON, calculate ES, EF, LS, LF, TF, and FF, and tabulate your answers. Find the CPs.

Discuss the changes by lead-lag relationships. What are the impacts of the relationships? What are the changes in CP, Duration, and Floats? And what do they mean to management? (The answer doesn't need to be long.)

These newly added relationships are tabulated below. [20 points]

Related Activities	Lead-Lag Relationships
D – G	SS = 8
E – H	FS = 2
E – I	FS = 2
H – J	SS = 3
I – J	FS = 2

**Question #4 [30 points]**

There are 6 activities (A, B, C, D, E, F) in a project, which are planned to be done within 4 months. Those activities, the times when they are scheduled to be performed, and the costs of the activities are tabulated below.

Activity	Schedule	Costs (\$ 1,000)
A	1st Month	600
B	1st Month	800
C	2nd Month	3500
D	3rdMonth	1200
E	3rd Month	1800
F	4th Month	1500

Use the cash flow charts attached to this exam to show the general contractor's cash flow for this project. Assume that the activities will be performed in a linear fashion. Round the numbers to the nearest whole number. There are two different payment conditions; (a) and (b).

- (a) The contractor submits his invoice on the last day of the month and gets paid 2 months after the submission. [20 points]
  
- (b) The owner is considering paying one month faster. Also, the owner will hold the 10% retention but only for the first 50% of the project's total worth. What impact will result? [10 points]