PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Summer 2017 - 18 Examination

Semester: 2   Date: 23/05/2018
Subject Code: 03216153   Time: 2:00 pm to 4:30 pm
Subject Name: Quantitative Methods in Construction Management   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) Enlist and explain assumptions underlying linear programming model. **(05)**
B) Differentiate between Big M method and Two phase method to solve LPP. **(05)**
C) What are decision trees? Under what circumstances are they employed for decision making? **(05)**

Q.2 **Answer the following questions. (Attempt any three) (Each of five marks)** **(15)**

A) A firm has six project sites and cement plants at place A, B and C with daily production of 50, 40, and 60 MT respectively. At point D, E and F it has three warehouses with daily demands of 20, 95 and 35 MT respectively. Per MT the shipping cost is given below:

Plant	Warehouse		
	D	E	F
A	6	4	1
B	3	8	7
C	4	4	2

If the firm wants to minimize the total transportation cost, how should it route its cement?

B) For the same data of Q.2 (A) follow the optimality test by stepping stone method.
C) For the same data of Q.2 (A) follow the optimality test by MODI method.
D) Explain the pitfalls of CPM/PERT in detail.

Q.3 A) For given problem answer the following with reasons: **(07)**

Basis		X_1	X_2	S_1	S_2	b_i
X_2	5	1	1	1	0	10
S_2	0	1	0	-1	1	3
C_j		4	5	0	0	
Solution		0	10	0	3	
Δ_j		-1	0	-5	0	

1. Is the solution is optimal?
2. Is this solution degenerate?
3. Is this solution feasible?
4. If S_1 is slack in machine A (in Hrs/Week) and S2 is slack in machine B (in Hrs/Week), which of these machine is being used to the full capacity when producing according to this solution?
5. Machine A has to be shut down for repairs for 2 hours next week. What will be the effect on profits?

B) Solve the LPP with graphical method. **(08)**
Maximize $Z = 2X_1 + X_2$
Subjected to,
$X_1 + 2X_2 \leq 10$; $X_1 + X_2 \leq 6$; $X_1 - X_2 \leq 2$; $X_1 - 2X_2 \leq 1$; X_1 and X_2 are positive.

OR

B) Solve the given LPP with simplex method. **(08)**
Maximize $Z = 40X1 + 35X2$
Subjected to,
$2X1 + 3X2 \leq 60$; $4X + 3X2 \leq 96$; X_1 and X_2 are positive.

Q.4 A) Two construction firms are competing to implement different strategies in order to increase **(07)**
number of projects. The tactics are given as follows:
(i) Increase advertising (ii) Price reduction (iii) Give discount on second project
Following is the effect on clients under different tactics:
   1. If both the firms use same strategies than, both will be equally benefited.
   2. If firm A applies increasing advertisement, 30% of clients in price reduction by firm B
      and 25% of clients with giving discount on second project.
   3. If firm A applies price reduction, 60% of clients in increasing advertisement by firm B
      and 40% of clients with giving discount on second project.
   4. If firm A applies discount on second project, 81% of clients with increasing advertisement
      by firm B and 47.5% of clients with price reduction.
What should be the optimal policies for both companies? Find out value of game.

OR

A) Explain "Analytical Hierarchy Approach" in detail with suitable example. **(07)**
B) Solve the following pay-off matrix for player A. Also find out the optimal strategies and value of **(08)**
the game using arithmetic method.

Player B

		B_1	B_2	B_3
Player A	A_1	1	0	2
	A_2	3	0	0
	A_3	0	2	1