2M5108

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M. B. A. II Sem. (Main / Back) Exam., April - May 2017

M-208A Operations Research

Time: 3 Hours **Maximum Marks: 70**

Min. Passing Marks: 28

Instructions to Candidates:

(i) *The question paper is divided in two sections.*

(ii) *There are sections A & B. Section A contains **6** questions out of which the candidate is required to attempt any **4** questions. Section B contains short case study / application based question which is **compulsory.***

(iii) *All questions carry **equal** marks.*

1. NIL 2. NIL

SECTION A

Q.1 (a) Define Operation Research. Discuss the various models of operation research. [7]

(b) What do you mean by linear programming model? Write its advantages and disadvantages. [7]

Q.2 (a) What do you mean by crashing in networks? Support your answer with suitable examples. [7]

(b) Distinguish between PERT and CPM. [7]

Q.3 Let us assume that you have inherited ₹ 1,00,000 from Mr. X that can be invested in a combination of only two stock portfolios, with the maximum investment allowed in either portfolio set at ₹ 75,000. The first portfolio has an average return of 10%, whereas the second has 20%. In terms of risk factors associated with these portfolios, the first has a risk rating of 4 (on a scale from 0 to 10), and the second has 9. Since you want to maximize your return, you will not accept an average rate of return below 12% or a risk factor above 6. Hence, you then face the important question, how much should you invest in each portfolio?

Formulate this as a linear programming problem and solve it by graphic method. [14]

Q.4 Solve the following problem using transportation method, obtaining the initial feasible solution by VAM. The cell entries in table are unit costs (in rupees). [14]

From	To					Supply
	1	2	3	4	5	
1	80	69	103	64	61	12
2	47	100	72	65	40	16
3	16	103	87	36	94	20
4	86	15	57	19	25	8
5	27	20	72	94	19	8
Demand	16	14	18	6	10	

Q.5 (a) Solve the game whose pay off matrix is given below: [7]

(Player – A) \ (Player – B)				
	8	4	2	-1
	9	-2	4	3
	4	-5	3	0
	3	-1	5	2
	7	3	0	-3

(b) A truck is priced at ₹ 60,000 and it's running costs are estimated at ₹ 6,000 for each of first years and increases by ₹ 2,000 per year in the fifth and subsequent years. It money is worth 10% per year, when should the truck be replaced. [7]

Q.6 (a) Construct the network diagram and identify the critical path to the following data: [10]

Jobs	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
t_o (days)	3	2	6	2	5	3	1	3	4
t_m (days)	6	5	12	5	11	6	4	9	19
t_p (days)	15	14	30	8	17	15	7	27	28

(b) Write a note on Monte Carlo Simulation. [4]

SECTION – B

Q.7 A firm has the choice of producing four similar products: P_1, P_2, P_3, and P_4 in any combination. These products have profits rates of ₹ 70, 65, 80, 75, respectively. They all require two types of raw material R_1 and R_2, and two types of labour L_1 and L_2. The per unit requirements and availability of the resources every week is given in the following table:

Resources ↓	Per Unit Requirement				Availability ↓
	P_1	P_2	P_3	P_4	
R_1	4	4	3	7	90 kg.
R_2	6	3	5	4	120 kg.
L_1	5	2	3	3	60 Hr.
L_2	6	5	1	2	100 Hr.

You are required to determine the optimal product mix for the firm and carry out the sensitivity analysis, for changes in the objective function coefficient and right hand side values of the constraints. [14]
