

August 2015

**Master of Business Administration (MBA) Examination
II Semester**

Operation Research For Business Decisions

Time : 3 Hours]

[Max. Marks : 80

- Note :** (1) Attempt any two questions from Section A and any three questions from Section B. All questions carry equal marks.
(2) Draw appropriate models, where applicable and be specific.
(3) Write in a legible hand and irrelevant matter shall lead to deduction of marks.

Section A

1. Define Quantitative Techniques and with suitable examples from the Industry, describe the scope of an Operations Research.
OR
Write barief note on different OR Models available for solving a management problem.
2. Describe any two of the following in context of Game Theory :
 - (a) Maximin and Minimax Principles.
 - (b) Pure and Mixed Strategies.
 - (c) Zero Sum Game and Saddle Points.
3. Explain the different classification of queuing models. Describe both single server and multi server queuing models.
4. Attempt any two from the following :
 - (a) Branch and Bound Algorithm.
 - (b) Monte Carlo Techniques with Applications.
 - (c) Markov Chain Analysis.

Section B

5. Solve the following Transportation Problem by using MODI or Stepping Stone Method for optimal cost :

	To From	Market				Supply
		P	Q	R	S	
Warehouse	A	6	3	5	4	22
	B	5	9	2	7	15
	C	5	7	8	6	08
	Demand	07	12	17	09	45

OR

Obtain the optimum solution of the following transportation problem using Modified Distribution Method :

	D1	D2	D3	D4	
S1	30	50	10	70	7
S2	48	36	40	44	9
S3	35	55	22	45	18
	5	8	7	14	

A machine operator processes five types of items on his machine each week, and must choose a sequence for them. The set-up cost per change depends on the item presently on the machine and the set-up to be made according to the following table :

From Item	To Item				
	A	B	C	D	E
A	∞	4	7	3	4
B	4	∞	6	3	4
C	7	6	∞	7	5
D	3	3	7	∞	7
E	4	4	5	7	∞

If he processes each type of item once and only once each week, how should he sequence the items on his machine in order to minimize the total set-up cost ?

7. The cost of a new machine is Rs. 5,000. Maintenance cost for nth year is given $R_n = 500 (n - 1)$. If the discount rate is 10% then, when shall machine be replaced ?

8. A repair shop attended by a single mechanic has an average of 4 customers per hour who bring small appliances for repair. The mechanic inspects them for defect and quite often can fix them right away or otherwise renders a diagnosis. This takes him 6 minutes on an-average. Arrivals are Poisson and service time has the exponential distribution. You are required to :
- (a) Find the proportion of time during which the shop is empty.
 - (b) Find the probability of finding at least one customer in the shop.
 - (c) The average number of customers in the system.
 - (d) The average time, including service, spent by a customer.
9. Formulate and solve (with Simplex Method) with the following Linear Programming Problem:
- The agricultural research institute suggested the farmer to spread out at least 4800 Kgs of special phosphate fertilizer and not less than 7200 Kgs of a special nitrogen fertilizer to raise the productivity of crops in his fields. There are two sources for obtaining these - mixtures A and mixtures B. Both of these are available in bags weighing 100 kg each and they cost Rs. 40 and Rs. 24 respectively. Mixture A contains phosphate and nitrogen equivalent of 20 kg and 80 kg respectively, while mixture B contains these ingredients equivalent of 50 kg each. Write this as an LPP and determine how many bags of each type the farmer should buy in order to obtain the required fertilizer at minimum cost.

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