October-November 2011

Master of Business Administration (MBA) Examination
II Semester

Operation Research For Business Decisions

Time : 3 Hours] **[Max. Marks : 80**

Note : *Attempt two questions from Section A and four questions from Section B. Each question in Section A will carry 10 marks. Questions in Section B will carry 15 marks each.*

Section A

1. Define Operations Research. Discuss its scope and importance.
2. What is dynamic programming and what sort of problems can be solved by it ? State Bellman's principle of optimality.
3. Write a note on any one of the following :
   (a) Post optimality analysis in Linear Programming.
   (b) Markov Chain Analysis.

Section B

4. Workers come to tool store room to receive special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 40 seconds. Determine :
   (a) average queue length.
   (b) average length of non-empty queues.
   (c) average number of workers in system.
   (d) mean waiting time of an arrival.
   (e) average waiting time of an arrival (worker) who waits.
5. Use simplex method to solve the following linear programming problem :

   Maximize $z = 3x_1 + 5x_2 + 4x_3$

   Subject to $2x_1 + 3x_2 \leq 8$

   $2x_2 + 5x_3 \leq 10$

   $3x_1 + 2x_2 + 4x_3 \leq 15$

   $x_1 x_2 x_3 \geq 0.$
6. Solve the transportation problem to maximize profits and give criterion for optimality :

	I	II	III	IV	Capicity
A	40	25	22	33	100
B	44	35	30	30	30
C	38	38	28	30	70
Requirement	40	20	60	30	

7. (a) Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and given in the following table :

		Jobs				
		1	2	3	4	5
	A	2	9	2	7	1
Men	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

Find the assignment that will minimize the total time taken.

(b) Bright bakery keeps stock of a particular brand of cake. Previous experience indicates that daily demand as given here :

Daily Demand	:	0	10	20	30	40	50
Probability	:	.01	.20	.15	.50	.12	.02

Consider the following sequence of random numbers (48, 78, 19, 51, 56, 77, 15, 14, 68, 09). Use this sequence and simulate the demand for next 10 days. Also estimate the daily average demand for the cakes on basis of simulated data.

8. (a) Consider the game G with following pay off :

		Ply B	
		B_1	B_2
Ply A	A_1	2	6
	A_2	-2	λ

(i) Show that the game value is strictly determinable, whatever λ may be.

(ii) Determine value of game.

(b) The following failure rates have been observed for a certain type of transistors in a digital computer :

End of week	:	1	2	3	4	5	6	7	8
Probability of failure to date	:	.05	.13	.25	.43	.68	.88	.96	1

Total transistors in one computer are 1000. The cost of replacing an individual failed transistor is Rs. 1.25, while the cost of group replacement is 30 paise per transistor. Determine the best interval between group replacements. Compare group individual replacements.

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