MBA(III)/11.16. 0685 Reg. No. | | | | | | | | |

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MBA (FT)/MBA(IB)/MBA(PT) DEGREE III SEMESTER EXAMINATION NOVEMBER 2016

SMS 2301/SMI 2302/SMP 2302 MANAGEMENT SCIENCE

(Regular and Supplementary)

Time: 3 Hours Maximum Marks: 50

PART A

(Answer ***ALL*** questions)

(5 × 2 = 10)

1. Define saddle point. Explain the significance of the solution, if there is no saddle point.
2. What is artificial variable? Discuss its need.
3. Distinguish between balking and reneging.
4. Define transition probability. Explain its role in Markov chain.
5. Distinguish between total float and free float.

PART B

(Answer ***ANY FIVE*** questions)

(5 × 4 = 20)

6. A retail store desires to determine the optimal daily order size for a perishable item. The store buys the perishable item at the rate of ₹60 per kg and sells at the rate of ₹90 per kg. If the order size is more than the demand, the excess quantity can be sold at ₹75 per kg in a secondary market; otherwise, the opportunity cost for the store is ₹10 per kg for the unsatisfied portion of the demand. Based on the past experience it is found that the demand varies from 50 kg to 200 kg in steps of 50 kg. The possible values of the order size are from 100 kg to 300 kg in steps of 100 kg. Determine the optimal order size which will maximized the daily profit of the store using Laplace criterion.

7. Solve the following LP problem graphically

$$\text{Maximize } Z = 60X_1 + 90X_2$$

Subject to

$$X_1 + 2X_2 \le 40$$
$$2X_1 + 3X_2 \le 90$$
$$X_1 - X_2 \ge 10$$
$$X_1 \text{ and } X_2 \ge 0$$

(P.T.O.)

8. The arrival rate of customers at a banking counter follows Poisson distribution with a mean of 30 per hour. The service rate of the counter clerk also follows Poisson distribution with a mean of 45 per hour. Find L_s and W_s.

9. Illustrate the application of Monte-Carlo simulation to determine the demand of a product if the demand follows a discrete distribution. Assume a suitable distribution of demand.

10. Consider the problem of assigning four sales persons to four different sales region as shown below such that the total sales is maximized. The cell entries represent annual sales figures in crores of rupees. Find the optimal allocation of the sales persons to different sales region.

		Sales region			
		1	2	3	4
Sales man	1	5	11	8	9
	2	5	7	9	7
	3	7	8	9	9
	4	6	8	11	12

11. Consider the following data of a project. Find the critical path and expected project completion time.

Activity	Predecessor(s)	Duration in months
A	-	3
B	-	6
C	A	4
D	B	3
E	A	4
F	C,D	5
G	C,D,E	3
H	F	9

12. Determine an initial basic feasible solution to the following transportation problem using Vogel's approximation method.

Origin		Destination					Supply
		A1	B1	C1	D1	E1	
	A	2	11	10	3	7	4
	B	1	4	7	2	1	8
	C	3	9	4	8	12	9
Demand		3	3	4	5	6	

(Cont...3)

PART C
(Answer ***ANY TWO*** questions)

(2 × 10 = 20)

13. Solve the following LP problem using simplex method.

Maximize $Z = 3X_1 + 2X_2 + 5X_3$

Subject to

$$X_1 + X_2 + X_3 \le 9$$
$$2X_1 + 3X_2 + 5X_3 \le 30$$
$$2X_1 - X_2 - X_3 \le 8$$
$$X_1, X_2 \text{ and } X_3 \ge 0$$

14. Consider the following table summarizing the details of a project.
   (a) Find the critical path and expected project completion time.
   (b) What is the probability of completing the project on or before 35 weeks?

Activity	Predecessor(s)	Duration (weeks)		
A	-	a 1	m 2	b 3
B	-	4	4	10
C	-	1	2	9
D	A	2	5	14
E	A	1	4	7
F	A	1	5	9
G	B,C	1	2	9
H	C	4	4	4
I	D	2	2	8
J	E,G	6	7	8
K	F, H	2	2	8
L	F, H	5	5	5
M	I, J ,K	1	2	9
N	L	6	7	8

15. Consider the following 3 machines and 5 jobs flow shop problem. Check whether Johnson's rule can be extended to this problem. If so, what is the optimal schedule and the corresponding makespan?

Job	Machine 1	Machine 2	Machine 3
1	11	10	12
2	13	8	20
3	15	6	15
4	12	7	19
5	20	9	7

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