A

MBA(FT)/MBA(IB)/MBA(PT) DEGREE III SEMESTER EXAMINATION NOVEMBER 2014

SMS 2301/SMI 2302/SMP 2302 MANAGEMENT SCIENCE
(2012 Scheme)

Time: 3 Hours

Maximum Marks: 50

PART A
(Answer *ALL* questions)

$(5 \times 2 = 10)$

1. What is saddle point?

2. What is alternate solution in linear programming? Illustrate it graphically.

3. Distinguish between assignment problem and transportation problem.

4. What is random number? List its properties.

5. Distinguish between CPM and PERT.

PART B
(Answer *ANY FIVE* questions

$(5 \times 4 = 20)$

6. Consider the following cost matrix and determine the best order size using minimax criteria.

Order size Q_i		Demand (D_j)				
		50	100	150	200	250
	75	50	125	375	375	125
	150	40	500	100	250	500
	225	750	550	250	750	125
	300	500	40	500	400	540

7. A manufacturer of leather belts makes three types of belts A, B, C which are processed on three machines X, Y, Z. Belt A requires 2 hours on machine X and 3 hours on machine Z. Belt B requires 3 hours on X, 2 hours on Y and 2 hours on Z. Belt C requires 5 hours on Y and 4 hours on Z. There are 8 hours of time per day available on machine X, 10 hours of time per day available on Y and 15 hours of time per day available on Z. The profit gained from belt A is ₹3 per unit, from B is ₹5 per unit and from belt C is ₹ 4 per unit. Formulate a LP model of the above problem.

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 Monte-Carlo simulation with an example.

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

Activity	Predecessor(s)	Duration (weeks)
A	--	3
B	--	6
C	A	4
D	B	3
E	A	4
F	C,D	5
G	C,D,E	3
H	F	1

(P.T.O.)

11. 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
Salesman	1	5	11	8	9
	2	5	7	9	7
	3	7	8	9	9
	4	6	8	11	12

12. Write the dual of the following LP problem.

Minimize $Z = 3X_1 - 2X_2 + 4X_3$

Subject to

$$3X_1 + 5X_2 + 4X_3 \geq 7$$
$$6X_1 + X_2 - 3X_3 \geq 4$$
$$7X_1 - 2X_2 + X_3 \leq 10$$
$$X_1 - 2X_2 + 5X_3 \geq 3$$
$$4X_1 + 7X_2 - 2X_3 \geq 2$$
$$X_1, X_2 \text{ and } X_3 \geq 0$$

PART C
(Answer ANY TWO questions)

(2 x 10 = 20)

13. Solve the following transportation problem.

	J1	J2	J3	J4	Supply
M1	21	16	25	13	11
M2	17	18	14	23	13
M3	32	17	18	41	19
Demand	6	10	12	15	

14. Vehicles are passing through a toll gate at the rate of 70 per hour. The average time to pass through the gate is 45 seconds. The arrival rate and service rate follow Poisson distribution. There is a compliant that the vehicles wait for long duration. The authorities are willing to install on more gate to reduce the average time to pass through the toll gate to 35 seconds if the idle time of the toll gate is less than 9% and the average queue length at the gate is more than 8 vehicles. Check whether the installation of the second gate is justified.

15. Players A and B play a game in which each player has three coins [25p, 50p and 100p]. Each of them selects a coin without the knowledge of the other person. If the sum of the values of the coins is an even number, A wins B's coin. If that sum is an odd number, B wins A's coin.
    (a) Develop a payoff matrix with respect player A.
    (b) Find the optimal strategies for the players.

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