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Question Paper Code : BS2015

M.B.A. DEGREE EXAMINATION, AUGUST/SEPTEMBER 2017.

Third Semester

DBA 1701 — APPLIED OPERATIONAL RESEARCH FOR MANAGEMENT

(Regulations 2007/2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State any two limitations of linear programming.

2. Define slack and surplus variables.

3. What are "loops" in a transportation table?

4. Explain degeneracy in a transportation problem and how to resolve it.

5. What is a mixed integer problem?

6. Explain the difference between a pure strategy and a mixed strategy.

7. What are the essential characteristics of dynamic programming?

8. What are the steps in decision making analysis?

9. Define effective arrival rate with respect to (M/M/1) : (FIFO/N/∞) queuing model.

10. Explain :

    (a) Expected waiting time in queue.

    (b) Expected waiting time in system.

PART B — (5 × 16 = 80 marks)

11. (a) Solve the following LPP by simplex method : (16)

Maximize $Z = 100\ x_1 + 200\ x_2 + 50\ x_3$

Subject to $5x_1 + 5x_2 + 10\ x_3 \leq 1000$

$10\ x_1 + 8x_2 + 5x_3 \leq 2000$

$10\ x_1 + 5x_2 \leq 500$

and $x_1, x_2 \geq 0$.

Or

(b) Use dual simplex method to solve the LPP. (16)

Maximize $Z = -3x_1 - 2x_2$

Subject to $x_1 + x_2 \geq 1$

$x_1 + x_2 \leq 7$

$x_1 + 2x_2 \geq 10$

$x_2 \leq 3$

and $x_1, x_2 \geq 0$

12. (a) Find the optimal transportation cost of the following problem. (16)

		Market					
		A	*B*	*C*	*D*	*E*	Available
Factory	*P*	4	1	2	6	9	100
	Q	6	4	3	5	7	120
	R	5	2	6	4	8	120
	Demand	40	50	70	90	90	

Or

(b) The projects *X*, *Y*, *Z* require truck loads of 45, 50 and 20 respectively per week. The availabilities in plants *A*, *B*, *C* are 40, 40 and 40 of truck loads respectively per week. The cost of transport per unit of truck load from plant to project is given below.

		Project		
		X	Y	Z
Plant	A	5	20	5
	B	10	30	8
	C	10	20	12

(i) Determine an initial solution by VAM.

(ii) Obtain an optimal solution by MODI method. The objective is to minimize the total cost of transportation. (16)

13. (a) Use Branch and Bound method to solve the following integer programming problem. (16)

Maximize $Z = 3x_1 + 4x_2$

Subject to $7x_1 + 16x_2 \leq 52$

$3x_1 - 2x_2 \leq 18$

and $x_1, x_2 \geq 0$ and integers.

Or

(b) Reduce the following game by dominance and find the game value. (16)

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

14. (a) Solve the following LPP by dynamic programming approach : (16)

Maximize $Z = 4x_1 + 14x_2$

Subject to $2x_1 + 7x_2 \leq 21$

$7x_1 + 2x_2 \leq 21$

and $x_1, x_2 \geq 0$.

Or

(b) The manager of a flower shop promises its customers delivery within four hours on all flower orders. All flowers are purchased on the previous day and delivered to parker by 8.00 a.m. the next morning. The daily demand for roses is as follows :

Dozens of roses :	70	80	90	100
Probability :	0.1	0.2	0.4	0.3

The manager purchases roses for Rs. 10 per dozen and sells them for Rs. 30. All unsold roses are donated to a local hospital. How many dozens of roses should parker order each evening to maximize his profit? What is the optimum expected profit. (16)

15. (a) A super market has two girls ringing up sales at the counters. If the service time for each customer is exponential with mean 4 minutes and if the people arrive in a poisson fashion at the rate of 10 per hour.

(i) What is the probability of having to wait for service? (5)

(ii) What is the expected precentage of idle time for each girl? (5)

(iii) If a customer has to wait, what is the expected length of his waiting time? (6)

Or

(b) A manufacturer is offered two machines *A* and *B*. A is priced at Rs. 5,000 and running costs are estimated at Rs. 800 for each of the first five years, increasing by Rs. 200 per year in the sixth and subsequent years. Machine *B*, which has the same capacity as *A*, costs Rs. 2,500 put will have running costs of Rs. 1,200 per year for six years, increasing by Rs. 200 per year there after. If money is worth 10% per year which machine should be purchased? Assume that the machines will eventually be sold for scrap at a negligible price. (16)

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