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Total No. of Pages : 03

Total No. of Questions : 15

MBA (2012 & Onward) (Sem.-3)

APPLIED OPERATIONS RESEARCH

Subject Code : MBA-301

Paper ID : [C1169]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A contains SIX questions carrying FIVE marks each and students has to attempt any FOUR questions.**
2. **SECTION-B consists of FOUR Subsections : Units-I, II, III & IV. Each Subsection contains TWO questions each carrying EIGHT marks each and student has to attempt any ONE question from each Subsection.**
3. **SECTION-C is COMPULSORY carrying EIGHT marks.**

SECTION-A

1. Write short note on Travelling Salesman problem.
2. Express the linear Programming Problem in its general form with Matrix Notation.
3. Mention the rules of drawing a network diagram.
4. Distinguish between CPM and PERT.
5. What do you mean by Pure and Mixed Strategy Game?
6. State the components of Queuing system.

SECTION-B

UNIT-I

7. Explain the characteristics of Operations Research. Discuss its importance in decision making process. Give the limitations of O.R.
8. The following information has been gathered for a project :

Activity	Duration	Immediate Predecessors
A	10	—
B	9	—
C	12	A
D	14	B
E	20	B
F	15	A
G	30	C
H	25	D
I	6	E,G,H
J	5	F,I

- Draw the Network Diagram for the Project.
- Determine the critical path and its duration.
- Compute slack, earliest start time & earliest finish time.

UNIT-II

- Solve the following LP - problem by SIMPLEX Method.

Maximize $z = 30x_1 + 40x_2$

Subject to

$$60x_1 + 120x_2 \leq 12,000$$

$$8x_1 + 5x_2 \leq 600$$

$$3x_1 + 4x_2 \leq 500$$

$$x_1, x_2 \geq 0$$

- A company is spending Rs. 1000/- on transportation of its units from three plants to four distribution centres. It has calculated the cost of transportation from different plants to distribution centres, given below in Rs. The supply and demand of units is also given below, Will the company save some money by optimum scheduling and how much?

Plant	Distribution Centre				Availability
	D ₁	D ₂	D ₃	D ₄	
P ₁	19	30	50	12	7
P ₂	70	30	40	60	10
P ₃	40	10	60	20	18
Requirements	5	8	7	10	

UNIT-III

11. Find the saddle point in the following case and also the game value.

		B	
	1	14	11
A	-9	5	-11
	0	-3	14

12. In a game of matching coins with two players, suppose A wins one unit of value when there are two heads, wins nothing when there are two tails and loses 1/2 unit of value when there is one head and one tail. Determine PAY-OFF matrix, the best strategy for each player and the value of the game to A.

UNIT-IV

13. In a bank where there is a single server, the arrival rate of customers is 5 per hour and service rate is 8 per hour, Assuming the conditions for the-single channel queuing model, find out :
- The probability that the server is idle.
 - The probability that there are at least two customers in the system.
 - Expected time that a customer spends in queue.
14. A self-service grocery store employs one cashier at its counter. Eight customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival and exponential distribution for service rate, find :
- Average number of customers in the system
 - Average number of customers in queue.
 - Average time a customer spends in the system.
 - Average time a customer waits before being served.

SECTION-C

15. Solve the following transportation problem by Least Cost method and check the feasibility of the solution. The unit costs of shipment are given in the cells below :

To	D	E	F	Supply
From				
A	6	4	1	50
B	3	8	7	40
C	4	4	2	60
Demand	20	95	35	150