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Total No. of Questions : 09] [Total No. of Pages : 03

Paper ID [MC305]

(Please fill this Paper ID in OMR Sheet)

MCA (Sem. - 3rd/4th)

COMPUTER BASED OPTIMISATION METHODS (MCA - 305) (N2)

Time : 03 Hours Maximum Marks : 60

Instruction to Candidates:

1) Attempt any one question from each Sections - **A, B, C, & D.**
2) Section - E is **compulsory**.

Section - A

(1 × 10 = 10)

Q1) Explain applications of O.R. in industry. State the different type of models used in O.R. Explain briefly the general methods for solving these O.R. models.

Q2) Solve the linear programming problem by graphical method,

Max $z = 3x + 4y$; subject to the constraints $4x + 8y \leq 32$, $9x + 2y \geq 14$, $\frac{3}{2}x + 5y \geq 15$ where $x, y \geq 0$.

Section - B

(1 × 10 = 10)

Q3) A company has three plants at A,B and C. Which supply to warehouses located at D,E,F,G and H. Weekly plant capacities are 200, 125 and 225 tons respectively. Weekly warehouses requirements are 75, 105, 130, 155 and 85 tons respectively unit transportation cost matrix is given below :

		To				
		D	E	F	G	H
	A	50	82	65	60	35
From	B	45	70	70	65	50
	C	80	45	75	65	60

Determine the optimum cost distribution pattern and also the minimum total cost.

Q4) An air-line operating seven days a week has time table shown below. Crews must have a minimum layover (Rest) time of 5 hours. Obtain the pair of flights that minimizes layover time away from home. For any given pair, the crew will be based at the city that results in the smaller layover. For each pair mention the town where the crews should be based.

Delhi - Jaipur			Jaipur - Delhi		
Flight No.	Depart.	Arrive	Flight No.	Depart.	Arrive
1	7: 00 AM	8: 00 AM	101	8: 00 AM	9: 15 AM
2	8: 00 AM	9: 00 AM	102	8: 30 AM	9 :45 AM
3	1: 30 PM	2: 30 PM	103	12:00 Noon	1: 15 PM
4	6: 30 PM	7: 30 PM	104	5: 30 PM	6: 45 PM

Section - C

(1 × 10 = 10)

Q5) Three players A, B and C play a sequence of games. It is also decided that winner of each game score one point and he who first scores three point is the final winner. A wins first and third games while B wins the second. What is the probability that C is the final winner.

Q6) A milk producing co-operative union desire to determine how many milligrams of butter it should produce on daily basis to meet the demand. Past records have shown the following pattern of demand.

Quantity demanded (No.of kg) :	15	20	25	30	35	40	45
No.of days on which given level of demand occurred :	4	16	20	80	40	30	10

Assume that the stock levels are restricted to the range 15-45 kg (a multiple of 5) and that the butter left unsold at the end of day must be disposed of due to inadequate storing facilities. Butter cost Rs.14.00 per kg. and sold at Rs. 20.00 per kg.

(a) Construct a conditional profit table.

(b) Determine EVPI.

Section - D

(1 × 10 = 10)

Q7) Solve the following problem by revised simplex method

Max $z = x_1 + 2x_2$ subject to $x_1 + x_2 \leq 3$, $x_1 + 2x_2 \leq 5$, $3x_1 + x_2 \leq 6$ and $x_1, x_2 \geq 0$.

Q8) Use branch and bound technique to solve the following integer programming problem.

Max $z = 7x_1 + 9x_2$ subject to $-x_1 + 3x_2 \leq 6$, $7x_1 + x_2 \leq 35$ $(x_1 \geq 0, x_2 \leq 7)$ and x_1, x_2 are integers.

Section - E

(10 × 2 = 20)

Q9) a) Write the dual of the following problem.

Min $z = x_1 + x_2$ subject to $3x_1 - x_2 \geq 2$, $2x_1 + x_2 \geq 5$, $x_1 \geq 0$, x_2 unrestricted in sign.

b) Explain in brief limitations of O.R.

c) Explain the concept of degeneracy in transportation problem.

d) "Much of the success of O.R. applications in the last three decades is due to computers". Discuss in brief.

e) A necessary and sufficient condition for the existence of feasible solution of transportation problem is $\Sigma ai = \Sigma bj$ (i = 1, 2, ... m; j= 1, 2, ...n).

f) What is unbalanced assignment problem.

g) What is conditional probability.

h) What is scientific decision making process.

i) What is the advantages of revised simplex method over simplex method.

j) What are applications of integer programming.

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