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

MCA (Sem. - 3rd)

COMPUTER BASED OPTIMIZATION TECHNIQUES

SUBJECT CODE : MCA - 302 (2012 Batch)

Paper ID : [B1158]

Time : 03 Hours **Maximum Marks : 100**

Instruction to Candidates:

1) Attempt any One question from each Section - **A, B,C & D.**
2) Section - E is **Compulsory.**
3) Use of non - programmable **Scientific Calculator** is allowed.

Section - A

Q1) a) Differentiate between Simplex and revised Simplex Method. **[5]**

b) Use Simplex Method to Solve the Problem.

$$\text{Min } Z = 3X_1 + 2X_2 + X_3 + 4X_4$$

Subject to
$$2X_1 + 4X_2 + 5X_3 + X_4 \geq 10$$
$$3X_1 - X_2 + 7X_3 - 2X_4 \geq 2$$
$$5X_1 + 2X_2 + X_3 + 6X_4 \geq 15$$
$$\text{Where } X_1, X_2, X_3, X_4 \geq 0$$ **[15]**

Q2) a) Limitation of Linear Programming Problems. **[5]**

b) $\text{Max } Z = 15\,X_1 + 45\,X_2$

Subject to
$$X_1 + 16X_2 \leq 240$$
$$5X_1 + 2X_2 \leq 162$$
$$X_2 \leq 50$$
$$\text{Where as } X_1 \,\&\, X_2 \geq 0$$

i) Find the optimal solution to the L.P.P.

ii) Discuss the effect of changing the availability from (240, 162, 50) to (250, 150, 52). **[15]**

Section - B

Q3) a) Explain Degeneracy in the Transportation problem. **[5]**

b) Solve the Transportation problem to maximize profits & give criterion for optimality. **[15]**

	I	II	III	IV	Capacity
A	40	25	22	33	100
B	44	35	30	30	30
C	38	38	28	30	70
Requirement	40	20	60	30	200 / 150

Q4) Solve the Transportation Table to find Initial Basic Feasible Solution using **Vogel's Approximation** Method. **[20]**

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

Section - C

Q5) The Project manager of Apollo Corporation finds that the budgeted amount for advertising during the next quarter permits 8 insertions in the three newspapers. The Times of India (T) Bombay, The Hindu (H) Madras and the Statesman (S) Calcutta. The Company Solicits enquiries from prospective customers through the ads and the number of enquiries received is used as a measure of the efficiency of the ads. The average estimated number of enquiries per insertion for various numbers of insertions in the three newspapers is given below.

No of Insertions	**Estimated Number of Enquiries**		
	T	**H**	**S**
0	150	160	200
1	165	170	240
2	190	210	270
3	230	245	320
4	260	260	340
5	290	300	350
6	330	310	355
7	350	315	360
8	360	315	360

It will be noticed that in each of newspapers, after a certain number of insertions the response remains static. This is because the response does not increase in direct proportion to the extent of advertising and reaches a saturation level. Using Dynamic Programming tell what should be the allocation of Insertions in each of newspapers in order to maximize the total number of enquiries? **[20]**

Q6) What do you mean by Dynamic Programming? Explain the Features and Application of Dynamic Programming. **[20]**

Section - D

Q7) How Integer Programming Differs from Linear Programming Problem and solve the following

Max. $Z = X_1 + X_2$

Subject to $2X_1 + 5X_2 \leq 6$

$6X_1 + 5X_1 \leq 30$

Where $X_1, X_2 \geq$ are all integers.

However, while applying Simplex Method to the above ILPP the optimal solution is given by the following table.

$C_j \rightarrow$			1	1	0	0
↓	Basic Variable	Solution value	X_1	X_2	S_1	S_2
1	X_2	9/5	0	1	3/10	-1/10
1	X_1	7/2	1	0	-1/4	1/4
	Z_j	53/10	1	1	1/20	3/20
		$C_j - Z_j$	0	0	-1/20	-3/203

Find the Integer Optimal Solution where X_1 X_2 are Integers. **[20]**

Q8) Differentiate between a Linear Programming and Integer Programming and Discuss Integer Programming using Suitable example. **[20]**

Section - E

Q9) Explain the following : ***(10 × 2 = 20)***

a) Assignment Problems.

b) Addition and multiplication law of Probability.

c) Conditional Probability.

d) Algebra of Events.

e) Operations Research.

f) Difference between a transportation problem and an assignment problem.

g) Sample Space.

h) Unbalanced Transportation Problems?

i) Non-Degenerate Basic feasible solution of an L.P.P.

j) Branch and Bound Technique.