MCA,SEM III, 2014
COMPUTER BASED OPTIMIZATION TECHNOQUE
PAPER CODE:MCA 302
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Note: Attempt FIVE Questions in all, including Q-9 in Section-E, which is compulsory and selecting ONE each from Section-A to Section-D.

Time Allowed: 3 hours ***Max Marks: 100***

SECTION-A

1)

a) What is linear programming? What are its major assumptions and characteristics?

b) A company owns two flour mills, A and B, which have different production capacities for high, medium and low grade flour. This company has entered into a contract to supply flour to a firm every week with minimum of 12, 8 and 24 quintals of high, medium and low grade, respectively. It costs the company Rs. 1000 and Rs. 800 per day to run mill A and B respectively. On a day, mill A produces 6, 2 and 4 quintals of high, medium and low grade flour respectively; mill B produces 2, 2 and 12 quintals of high, medium and low grade flour respectively. How many days per week should each mill be operated in order to meet the contract most economically? Formulate the Linear Programming Problem and solve graphically. (10, 10)

2) Give a brief outline of the simplex method to solve a Linear Programming Problem. Solve the following LPP using simplex method:

Maximize $z = 3x_1 + 5x_2 + 4x_3$

Subject to the constraints:

$$2x_1 + 3x_2 \le 8$$
$$2x_2 + 5x_3 \le 10$$
$$3x_1 + 2x_2 + 4x_3 \le 15$$
$$x_1, x_2, x_3 \ge 0.$$

(20)

SECTION-B

3) A company is faced with the problem of assigning five salesmen to five sales territories. The estimated sale revenue, in Rupees, of the salesmen in each territory is given in the following table:

SALES TERRITORY

		M1	M2	M3	M4	M5
Salesmen	S1	32	30	34	33	36
	S2	34	37	32	36	35
	S3	33	30	29	31	34
	S4	32	28	31	34	30
	S5	29	31	32	30	36

Determine the assignment of salesmen to sales territory so as to obtain maximum sales revenue, using the 'Hungarian Assignment Method'. (20)

4) Consider the transportation problem having the following parameter table:

Source	Destination A	B	C	D	Supply
I	3	5	2	4	5
II	4	6	6	1	6
III	3	1	12	1	7
IV	8	4	5	3	4
Demand	3	5	4	5	

Use the Vogel's approximation method to obtain an initial solution, and then solve the problem. (20)

SECTION-C

5) Define a dynamic programming problem. Write the principle of optimality. Discuss the basic features which characterize the dynamic programming problem. (20)

6) A fair six-sided die is thrown twice.
   a) Identify the sample space. What is the total number of elements in the sample space?
   b) Explicitly identify the event E = {The sum of the face values of these two tosses is 5}, and calculate P(E), the probability of event E.
   c) Given that the event E happens, what is the probability that the face value of the first toss is less than that of the second toss? (6, 8, 6)

SECTION-D

7) Solve the following all integer LPP using the Gomory's cutting-plane method:

Maximize $3x_1 + 5x_2$

Subject to $2x_1 + 4x_2 \leq 25$

$x_1 \leq 8$

$2x_2 \leq 10$, x_1, x_2 are non-negative integers (20)

8) Consider the integer linear programming problem:

Maximize $Z = 7x_1+9x_2$

Subject to

$-x_1+3x_2 \leq 6$

$7x_1+x_2 \leq 35$

x_1, x_2 non-negative integers.

Outline briefly the steps of branch-and-bound algorithm (B&B) and using the same, obtain the optimal solution. (20)