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10MCA25

Second Semester MCA Degree Examination, June 2012

Operations Research

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. What are the different phases of OR study? Explain briefly. **(06 Marks)**

b. The Win Window Company is a company with only three employees which makes two different kinds of hand crafted windows; a wood-framed and an aluminium framed window. They earn Rs.60 profit for each wood framed window and Rs.30 profit for each aluminium framed window. Mr. X makes the wood frames, and can make 6 per day. Mr. Y makes the aluminium frames and can make 4 per day. Mr. Z forms and cuts the glass and can make 48 square feet of glass per day. Each wood framed window uses 6 square feet of glass and each aluminium framed window uses 8 square feet of glass. The company wishes to determine how many windows of each type to produce per day to maximize total profit. Formulate a linear programming model for this problem. **(06 Marks)**

c. Solve the following LPP graphically:
Maximize, $Z = 2x_1 + x_2$
Subject to $x_2 \le 10$, $2x_1 + 5x_2 \le 60$, $x_1 + x_2 \le 18$, $3x_1 + x_2 \le 44$ and $(x_1, x_2 \ge 0)$. **(08 Marks)**

2 a. Solve the following LPP by simplex method:
Maximize, $Z = x_1 + 3x_2$
Subject to $x_1 + 2x_2 \le 10$, $x_1 \le 5$, $x_2 \le 4$ and $x_1, x_2 \ge 0$. **(10 Marks)**

b. Solve the following LPP by simplex method:
Minimize $Z = x_1 - 3x_2 + 2x_3$;
Subject to $3x_1 - x_2 + 2x_3 \le 7$; $-2x_1 + 4x_2 \le 12$, $-4x_1 + 3x_2 + 8x_3 \le 10$; $x_1, x_2, x_3 \ge 0$.
(10 Marks)

3 a. What is degeneracy? Write the steps in resolving degeneracy. **(10 Marks)**

b. Maximize $5x_1 + 8x_2$
Subject to the restrictions $4x_1 + 6x_2 \le 24$, $2x_1 + x_2 \le 18$, $3x_1 + 9x_2 \le 36$ and $x_1, x_2, x_3 \ge 0$ using simplex method. **(10 Marks)**

4 a. Solve the following LPP using M-method:
Maximize $Z = 6x_1 + 4x_2$
Subject to $2x_1 + 3x_2 \le 30$, $3x_1 + 2x_2 \le 24$, $x_1 + x_2 \ge 3$ and $x_1, x_2 \ge 0$. **(10 Marks)**

b. Solve the following LPP using Two-phase simplex method:
Minimize $Z = 7.5x_1 - 3x_2$
Subject to $3x_1 - x_2 - x_3 \ge 3$, $x_1 - x_2 + x_3 \ge 2$, and $x_1, x_2, x_3 \ge 0$. **(10 Marks)**

5 a. Solve the following LPP using dual simplex method:
Maximize $Z = -3x_1 - 2x_2$
Subject to $x_1 + x_2 \ge 1$, $x_1 + x_2 \le 7$, $x_2 \le 3$ and $x_1, x_2 \ge 0$. **(10 Marks)**

b. Use revised simplex method to solve the following LPP:
Minimize $Z = 3x_1 + 5x_2$
Subject to $2x_1 \le 4$, $3x_2 \le 6$, $3x_1 + 2x_2 \le 18$, and $x_1, x_2 \ge 0$. **(10 Marks)**

6 a. Determine the initial basic feasible soiation for the following transportation problem by VAM method, NWC rule and least cost method. **(10 Marks)**

	D_1	D_2	D_3	D_4	Supply
01	6	1	9	3	70
02	11	5	2	8	55
03	10	12	4	7	70
Demand	85	35	50	45	

b. For different jobs can be done on four different machines and take down time costs are prohibitively high for changeovers. The matrix below gives the cost in rupees of producing job 'i' on machine 'j'.

Jobs	Machine			
	M_1	M_2	M_3	M_4
J_1	5	7	11	6
J_2	8	5	9	6
J_3	4	7	10	7
J4	10	4	8	3

How should the jobs be assigned to various machines so that the total cost is minimized? **(10 Marks)**

7 a. Write the outline of the basic genetic algorithm and limitations of standard basic genetic algorithm. **(10 Marks)**

b. Use Tabu Search algorithm to find the optimal solution of the following:
Constraint 1: Link AD can be included only if link DE is also included.
Constraint 2: At most one of the three links AD, CD, AB can be included. Charge a penalty of 100 if constraint 1 is violated. Charge a penalty of 100 if two of the three links specified in constraint 2 are included. Increase this penalty to 200 if all three of the links are included.

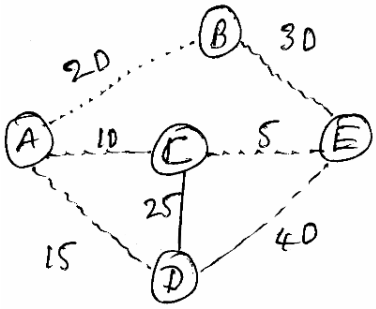

Fig.Q7(b) **(10 Marks)**

8 a. Define the following:
i) Strategy
ii) Two person zero-sum game
iii) Pay-off matrix
iv) Optimum strategy. **(08 Marks)**

b. Solve the following 2×3 game by graphical method. **(12 Marks)**

		B		
		I	II	III
A	I	1	3	11
	II	8	5	2

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