BACHELOR OF SCIENCE (COMPUTER SCIENCE) (CBCS - 2018 COURSE)
S.Y.B.Sc.(Computer Science) Sem-IV :SUMMER- 2022
SUBJECT : OPTIMIZATION TECHNIQUES

Day : Friday
Date : 8/7/2022

S-20106-2022

Time : 03:00 PM-06:00 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.

Q.1 Attempt **ANY TWO** of the following: **(12)**

a) A manufacturing company makes two models A and B of a product. Each piece of a model A requires 9 labour hours for fabricating and 1 labour hour for finishing. Each piece of model B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing, the maximum labour hours available are 180 and 30 respectively. The company makes profit of Rs. 8,000 on each piece of model A and Rs. 12,000 on each piece of model B. How many pieces of model A and model B should be manufactured per week to get a maximum profit? What is the maximum profit?
(Solve by graphical method).

b) Solve the following L.P.P. by simplex method:

Minimize $Z = 10x_1 + 6x_2 + 2x_3$

Subject to $-x_1 + x_2 + x_3 \geq 1$

$3x_1 + x_2 - x_3 \geq 2$.

$x_1, x_2, x_3 \geq 0$

c) Solve the following assignment problem

		Machines			
		I	**II**	**III**	**IV**
Jobs	**A**	1	3	5	2
	B	8	6	9	8
	C	3	4	10	6
	D	7	6	7	4

Q.2 Attempt **ANY TWO** of the following: **(12)**

a) Describe the steps for finding an initial basic feasible solution of transportation problem by Vogel's Approximation Method (VAM).

b) Find an initial basic feasible solution of the following transportation problem by North-West Corner Method.

To → / **From ↓**	**W_1**	**W_2**	**W_3**	**W_4**	**Supply**
F_1	30	25	40	20	100
F_2	29	26	35	40	250
F_3	31	33	37	30	150
Demand	90	160	200	50	500

c) Solve the given problem by dual simplex method:

Minimize $Z = 2x + 3y$

Subject to $2x + 3y \leq 30$

$x + 2y \geq 10$.

$x \geq 0,\ y \geq 0$

P.T.O.

Q.3 Attempt **ANY TWO** of the following: **(12)**

a) Explain the procedure of graphical method of solving $2 \times m$ or $n \times 2$ game.

b) Solve the following game by dominance principle :

Player B

Player A	*I*	*II*	*III*	*IV*	*V*
I	3	5	4	9	6
II	5	6	3	7	8
III	8	7	9	8	7
IV	9	2	8	5	3

c) Solve the following assignment problem.

	A	**B**	**C**	**D**
I	2	3	4	5
II	4	5	6	7
III	7	8	9	8
IV	3	5	8	4

Does it have alternative optimal solution? If yes, find it.

Q.4 Attempt **ANY THREE** of the following: **(12)**

a) Explain the following terms :

1) Objective functions
2) Feasible solution.

b) What is an unbalanced assignment problem? How to make such problem balanced.

c) Determine the optimum assignment so as to minimize the total cost, where '–' indicates job cannot be assign to machine table.

Machines

Jobs	**P**	**Q**	**R**	**S**	**T**
A	7	7	–	4	8
B	9	6	4	5	6
C	11	5	7	–	5
D	9	4	8	9	4
E	8	7	9	11	3

d) Solve the following game by using subgame method:

	I	*II*
I	−4	3
II	−2	−4
III	−1	−6

Q.5 Attempt **ANY FOUR** of the following: **(12)**

a) Write down advantages of dual of L.P.P.

b) Obtain the standard form of given L.P.P.

Maximize $Z = 2x + 3y$

Subject to $2x + 3y \geq 5$

$2x + 4y \leq 7$.

$x \geq 0,\ y \geq 0$

c) Is the following game fair game ?

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} \begin{array}{ccc} B & & \end{array} \\ \begin{bmatrix} -1 & 0 & -3 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix} \end{array}$$

d) Define i) Value of the game ii) Saddle point.

e) Determine whether the following solution is degenerate ? Justify.

5	8	6	6 5	3 3
4 4	7	7	6 1	5
8	4 4	6	6	4 5

f) Explain how to solve maximization assignment problem.

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