BACHELOR OF SCIENCE (COMPUTER SCIENCE) (CBCS - 2016 COURSE)
S.Y.B.Sc.(Computer Science) Sem-IV :SUMMER- 2022
SUBJECT : OPTIMIZATION TECHNIQUES

Day : Friday
Date : 8/7/2022

S-14895-2022

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) Explain the terms:
- i) Objective function
- ii) Linearity constraints
- iii) Feasible solution .

b) Solve the following L.P.P. graphically:

Maximize $Z = x + 3y$

Subject to $3x + 6y \geq 8$

$5x + 2y \geq 10$

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

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

Minimize $z = x_1 - 3x_2 + 2x_3$

Subject to $3x_1 - x_2 + 2x_3 \leq 7$

$-2x_1 + 4x_2 \leq 12$

$4x_1 + 3x_2 + 8x_3 \leq 10$

$x_1, x_2, x_3 \geq 0$

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

a) Describe the steps for finding the initial solution by Vogel's approximation method.

b) Fined initial Feasible solution of the following transportation problem by North - West corner method.

	W_1	W_2	W_3	W_4	Supply
F_1	6	5	8	5	30
F_2	5	11	9	7	40
F_3	8	9	7	13	50
Demand	35	28	32	25	

c) Solve the following assignment problem for minimum cost:

	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

P.T.O

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

a) What is an unbalanced assignment problem? How to make problem balanced?

b) Solve the following game by graphical method:

		Player B	
		B_1	B_2
Player A	A_1	-7	6
	A_2	7	-4
	A_3	-4	-2
	A_4	8	-4

c) Reduce the following game by the dominance principle and find value of the game: $\begin{bmatrix} 8 & 10 & 9 & 14 \\ 10 & 11 & 18 & 12 \\ 13 & 14 & 14 & 13 \end{bmatrix}$

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

a) Solve the following assignment problem for minimum cost, where '-' represent no assignment of job to that respective machine.

		Machine			
		A	B	C	D
Jobs	I	4	7	5	6
	II	-	8	7	4
	III	3	-	5	3
	IV	6	6	4	2

b) Find the dual of the following L.P.P.

Minimize $Z = 2x_1 + 2x_2$

Subject to $2x_1 + 4x_2 \geq 1$

$x_1 + 2x_2 \geq 1$

$2x_1 + x_2 \geq 1$

$x_1, x_2 \geq 0$

c) Solve the following game by algebraic method:

		Player C	
		A	B
Player A	I	20	-6
	II	-4	3

d) Solve the following assignment problem:

	C_1	C_2	C_3
A_1	1	4	5
A_2	2	3	3
A_3	3	1	2

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

a) Define : i)Value of the game ii) Saddle point

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

Maximize $Z = 2x+3y$

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

$2x+4y \geq 7$

$x,\ y \geq 0$

c) Determine whether following assignment problem is balanced? If not balanced it:

		Jobs			
		I	II	III	IV
Operator	A	3	2	1	5
	B	3	1	7	8
	C	7	6	4	10

d) Write the advantages of the dual of L.P.P.

e) Determine the saddle point of the following game:

	B_1	B_2	B_3
A_1	1	3	1
A_2	0	-4	-3
A_3	1	5	-1

f) Define loop in transportation problem. Give some properties of it.

* * * * *