BACHELOR OF SCIENCE (COMPUTER SCIENCE) (CBCS - 2018 COURSE)
S.Y.B.Sc.(Computer Science) Sem-IV : WINTER :- 2021
SUBJECT: OPTIMIZATION TECHNIQUES

Day : Tuesday
Date 25-01-2022 **W-20106-2021**
Time : 02:00 PM-05:00 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 firm uses lathes, milling machines and grinding machines to produce two machine parts. The following table represents machining times required for each part, the machining time available on different machines and profit on each machine part.

Type of machine	**Time required for (in minutes)**		**Time available (in minutes)**
	Part-I	**Part-II**	
Lathes	12	6	3000
Milling machines	4	10	2000
Grinding	2	3	900
Profit per unit	Rs. 40	Rs. 100	

How many parts of both types should be produced to get a maximum profit? (Solve by graphical method).

b) Solve the following L.P.P. by Simplex method.

Maximize $Z = 6x+3y$

Subject to $2x+y \le 8$

$3x+3y \le 18$

$y \le 3$

$x \ge 0,\ y \ge 0$

c) The problem of assigning four operators to four machines is given below. The operator I cannot be assigned to machine C also operator III cannot be assigned to machine D. find the optimal assignment.

Machines

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

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

a) Define loop in transportation problem. What is the role of loop? Give some properties of it.

b) Solve the following transportation problem by Vogel's Approximation Method (VAM) :

	D1	**D2**	**D3**	**Available**
O1	2	7	4	5
O2	3	3	1	8
O3	5	4	7	7
O4	1	6	2	14
Required	7	9	18	

P.T.O.

c) Find the initial allocation of the given transportation problem by Least Cost Method.

	P	Q	R	S	Supply
A	8	10	7	6	50
B	12	9	4	7	40
C	0	11	10	8	30
Demand	25	32	40	23	

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

a) Explain Hungarian method to solve assignment problem for minimization.

b) Solve the following game graphically.

Player B

Player A	B_1	B_2
A_1	1	6
A_2	8	5
A_3	5	4
A_4	10	3

c) Solve the following assignment problem.

Jobs

Persons	I	II	III
A	7	3	5
B	2	7	4
C	6	5	3
D	3	4	7

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

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

Maximize $Z = x_1 + 2x_2 + 3x_3 - x_4$

Subject to $x_1 + 2x_2 + x_3 = 15$

$2x_1 + x_2 + 5x_3 \leq 20$

$x_1 + 2x_2 + x_3 + x_4 = 10.$

b) Transform the following game matrix into L.P.P. for player A.

Player B

Player A	Q_1	Q_2	Q_3
P_1	0	−1	1
P_2	1	1	−1
P_3	1	−1	0

c) Find the best strategies for each player and the value of game for given pay-off matrix :

Player B

Player A	B_1	B_2
A_1	5	3
A_2	1	4

d) Explain the terms :

i) Feasible Solution

ii) Optimal Solution

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

a) What are the disadvantages of the graphical method in L.P.P.?

b) What is degeneracy in L.P.P. solution? Explain how degeneracy is resolved.

c) Determine whether following solution is optimal? Justify.

23 2	42	33	11
17 2	25 1	45	20
3	12	8 5	18 7

d) Define : i) Mixed Strategy ii) Pure strategy.

e) Determine the saddle point of the game :

$$\begin{array}{c} \\ A_1 \\ A_2 \\ A_3 \end{array} \begin{array}{c} \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\ \begin{bmatrix} 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{bmatrix} \end{array}$$

f) Solve the following assignment problem:

	A	B	C
I	0	1	4
II	4	0	2
III	2	0	3

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