Seat No. [ ]

**B.Sc. (Part - III) (Semester - V) (CBCS)**
**Examination, January - 2023**
**MATHEMATICS**
**Optimization Technique (Paper-XI)**
**Sub. Code: 79674**

Day and Date : Thursday, 05 - 01 - 2023                    Total Marks : 40
Time : 2.30 p.m. to 4.30 p.m.

Instructions :     1)     All questions are compulsory.
                   2)     Figures to the right indicates full marks.

**Q1)** Choose Correct Alternative. (1 marks each)                    **[8]**

a)     The mathematical model of an LP problem is important because_____.

    i)     It helps in converting the verbal description & numerical data into mathematical expression

    ii)     It captures the relevant relationship among decision.

    iii)     Decision-makers prefer to work with formal models

    iv)     It enables the use of algebraic technique

b)     The initial solution of a T.P. is obtained by _____.

    i)     North-West Corner Rule would in variably be optimum

    ii)     Least cost method does not provide that least cost solution to a T.P.

    iii)     VAM would invariably be very near to optimum solution

    iv)     MODI method is infeasible

c)     Which statement is true about the game $\begin{bmatrix} 1 & -3 \\ 4 & 1 \end{bmatrix}$ ?

    i)     game is fair                    ii)     value of the game is 4.

    iii)     value of the game is 1.     iv)     no saddle point exists.

*P.T.O.*

d) An assignment problem with 3 rows & 5 columns is converted into balanced assignment problem by _____.

   i)    adding 2 columns with each cost 0

   ii)   adding 2 rows with each cost 0

   iii)  adding 1 columns with each cost 0

   iv)  adding 3 rows with each cost 0

e) Every basic feasible solution of a general assignment problem, having a square payoff matrix of order n should have assignments equal to _____.

   i)    2n+1                ii)   m+n

   iii)  m+n-1           iv)  2n-1

f) The L.P.P. Min $z = -x + 2y$ subject to $-x + 3y \leq 10$, $x + y \leq 6$, $x - y \leq 2$, $x \geq 0$ $y \geq 0$ which of the following coordinate is corner point of the region of the feasible solutions of above L.P.P.?

   i)    (0,0)                ii)   (4,2)

   iii)  (2,5)                iv)  (1,2)

g) In solving 2 machine and n jobs sequencing problem, the following assumption is wrong.

   i)    No passing is allowed

   ii)   Processing times are known

   iii)  Handling time is negligible

   iv)  The time of passing depends on the order of machining.

h) The method of finding an initial solution based upon opportunity costs is called _____.

   i)    the northwest corner rule

   ii)   Vogel's approximation

   iii)  Flood's technique

   iv)  Hungarian method

**Q2)** Attempt any two of the following. [16]

a) What is an assignment problem? Explain Hungarian method to solve assignment problem.

b) Determine the initial basic feasible solution of the following transportation problem by Vogel's approximation method and test it for optimality.

Factories

|  | D1 | D2 | D3 | D4 | Supply |
|---|---|---|---|---|---|
| O1 | 19 | 30 | 50 | 10 | 7 |
| O2 | 70 | 30 | 40 | 60 | 9 |
| O3 | 40 | 5 | 70 | 20 | 18 |
| Demand | 5 | 8 | 7 | 14 | |

Warehouse

c) Solve the following game by graphical method.

Player B

|  |  | I | II | III | IV |
|---|---|---|---|---|---|
|  | I | 8 | 5 | -7 | 9 |
| Player A | II | -6 | 6 | 4 | -2 |

**Q3)** Attempt any Four of the following. [16]

a) Give Johnson's procedure for determining an optimal sequence for processing n items on two machines.

b) Define assignment problem and give the mathematical formulation of it.

c) Solve the following game by arithmetic method.

|  |  | Player B | | |
|---|---|---|---|---|
|  |  | I | II | III |
|  | I | 1 | 7 | 2 |
| Player A | II | 6 | 2 | 7 |
|  | III | 5 | 1 | 6 |
|  | III | 6 | 0 | 12 |