**[Total No. of Questions - 9] [Total No. of Printed Pages - 3] (2125)**

**15619**

**MCA 4th Semester Examination**

**Operational Research (NS)**

**MCA-403**

**Time : 3 Hours** **Max. Marks : 60**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C and D. Section-E is compulsory. Attempt all the subparts of the question in section-E. Each question carries 12 marks.

## SECTION - A

1. What is operation research? Discuss the uses and limitations of operation research. (12)

2. Solve the following linear programming problem by graphical method

   Maximize Z = 3x + 4y

   Subject to, $5x+4y \leq 200$, $3x+5y \leq 150$, $5x+4y \geq 100$, $8x+4y \geq 80$ and $x,y \geq 0$. (12)

## SECTION - B

3. Solve the following linear programming problem using dual simplex method

   Maximize Z = –3x–2y

   Subject to, $x+y \geq 1$, $x+y \leq 7$, $x+2y \geq 10$, $y \leq 3$ and $x,y \geq 0$ (12)

**[P.T.O.]**



4. Draw the network and determine the critical path for the given data. Also calculate all the floats involved in CPM.

| Activity | 1-2 | 1-3 | 2-4 | 3-4 | 3-5 | 4-5 | 4-6 | 5-6 |
|---|---|---|---|---|---|---|---|---|
| Time in weeks | 6 | 5 | 10 | 3 | 4 | 6 | 2 | 9 |

(12)

## SECTION - C

5. What is optimality test? Discuss the various steps involved in the stepping stone method to perform the optimality test.(12)

6. Solve the following transportation problem using Vogel's method.

| | Destination | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Source | | A | B | C | D | E | F | Supply |
| | 1 | 9 | 12 | 9 | 6 | 9 | 10 | 5 |
| | 2 | 7 | 3 | 7 | 7 | 5 | 5 | 6 |
| | 3 | 6 | 5 | 9 | 11 | 3 | 11 | 2 |
| | 4 | 6 | 8 | 11 | 2 | 2 | 10 | 9 |
| | Demand | 4 | 4 | 6 | 2 | 4 | 2 | |

(12)

## SECTION - D

7. Write short note on the following:

   (a) Selective Control Techniques.

   (b) Factors involved in Inventory analysis. (6×2=12)

8. Solve the following problem graphically.

| | Player B | |
|---|---|---|
| Player A | 1 | 2 |
| | 5 | 4 |
| | -7 | 9 |
| | -4 | -3 |
| | 2 | 1 |

(12)

## SECTION - E

9. Answer the following:

(i) What are surplus variables?

(ii) What is a feasible solution?

(iii) What is a basic solution?

(iv) What is a merge event?

(v) What is dangling?

(vi) Define critical activity.

(vii) What is non-degenerate solution in a transportation problem?

(viii) Write the difference between a transportation problem and an assignment problem

(ix) What is an unbalanced assignment problem?

(x) Define shortage cost.

(xi) Define order cycle in an inventory system.

(xii) Define saddle point. (12×1=12)