**Bachelor of Science (Information Technology) (I.T.) Semester—VI Examination**

**OPERATION RESEARCH**

**Paper—6**

Time : Three Hours] [Maximum Marks : 50

**N.B. :—** (1) **ALL** questions are compulsory and carry equal marks.
(2) Draw neat and labelled diagram wherever necessary.

**EITHER**

1. (A) Explain operation research models with example. 5

(B) Solve the following linear programming problem using graphical method :

Maximize $Z = 6x_1 + 8x_2$

Subject to $5x_1 + 10x_2 \leq 60$

$4x_1 + 4x_2 \leq 40$

$x_1$ and $x_2 \geq 0$ 5

**OR**

(C) What do you mean by linear programming problem ? What are its major limitations ? 5

(D) Solve the following linear programming problem by using simplex method :

$Z$ (max) = $3x_1 + 5x_2 + 4x_3$

Subject to $2x_1 + 3x_2 \leq 8$, $2x_2 + 5x_3 \leq 10$

$3x_1 + 2x_2 + 4x_3 \leq 15$ and $x_1, x_2, x_3 \geq 0$. 5

**EITHER**

2. (A) Explain least cost method with example. 5

(B) Find the feasible solution of the following transportation problem using north west corner method :

| | $W_1$ | $W_2$ | $W_3$ | $W_4$ | Supply |
|---|---|---|---|---|---|
| $F_1$ | 14 | 25 | 45 | 5 | 5 |
| $F_2$ | 65 | 25 | 35 | 55 | 12 |
| $F_3$ | 35 | 3 | 65 | 15 | 13 |
| Demand | 10 | 3 | 9 | 8 | |

5

**OR**

(C) Determine an initial basic feasible solution to the following transportation problem using Vogel's Approximation Method (VAM) :

| $D_1$ | $D_2$ | $D_3$ | $D_4$ | |
|---|---|---|---|---|
| 1 | 2 | 1 | 4 | 8 |
| 3 | 3 | 2 | 1 | 9 |
| 4 | 2 | 5 | 9 | 20 |
| 5 | 3 | 6 | 10 | 24 |
| 13 | 10 | 14 | 24 | |

5

(D) Explain in detail transportation model. 5

**EITHER**

3. (A) Distinguish between CPM and PERT. 5

(B) Explain characteristics of dynamic programming. 5

**OR**

(C) Write notes on :

(a) Forward Recursion

(b) Backward Recursion. 5

(D) Draw the Network diagram for the following activities :

A < D, E ; B, D < F;

C < G ; B, G < H;

F, G < I. 5

**EITHER**

4. (A) Discuss the mathematical model of assignment problem. Explain in detail Hungarian method of solving assignment problem. 5

(B) Determine the minimum cost assignment of subcontractor to bidder. Assuming that each bidder can receive only one contract.

Bad Amount (in thousand Rs.)

| | I | II | III | IV | V |
|---|---|---|---|---|---|
| 1 | 41 | 72 | 39 | 52 | 25 |
| 2 | 22 | 29 | 49 | 65 | 81 |
| 3 | 27 | 39 | 60 | 51 | 40 |
| 4 | 45 | 50 | 48 | 52 | 37 |
| 5 | 29 | 40 | 45 | 26 | 30 |

5

**OR**

(C) Explain Branch and Bound technique for solving assignment problem with example. 5

(D) What is zero-one programming model ? Explain. 5

5. Attempt **ALL** :

(A) Define artificial variable. 2½

(B) Write the steps of assignment problem. 2½

(C) Differentiate between Bound algorithm and Cutting Plan algorithm. 2½

(D) Explain the steps of Hungarian method. 2½