NP – 440

VI Semester B.C.A. Examination, July/August 2024
(NEP)
COMPUTER SCIENCE
CAE2 : a) Operations Research (Elective – II)

Time : 2½ Hours

Max. Marks : 60

Instructions : 1) Answer **all** Sections.
2) Answer **any four** questions from **each** Section.

SECTION – A

I. Answer **any four** questions. **Each** question carries **2 marks.**　　　　(4×2=8)

1) What is operational research ?

2) Define slack and surplus variables.

3) What is unbalanced transportation problem ?

4) Define saddle point and value of the game.

5) What are the applications of PERT/CPM Techniques ?

6) What is pay off matrix ? Give example.

SECTION – B

II. Answer **any four** questions. **Each** question carries **5 marks.**　　　　(4×5=20)

7) Solve the following LPP by Graphical method.

Maximize, $z = 3x + 4y$

Subject to $4x + 8y \leq 32$

$9x + 2y \geq 14$

$3x + 10y \geq 30$ where $x, y \geq 0$.

8) Explain the applications of operational research.

9) Using North West Corner Rule to obtain an initial basic feasible solution of the given transportation problem.

					Supply
A	3	1	7	4	300
B	2	6	5	9	400
C	8	3	3	2	500
Demand	250	350	400	200	

P.T.O.

10) Explain Hungarian method for solving Assignment problem.

11) a) Define optimality test.

   b) Explain modified distribution method in detail.

12) A project schedule has the following characteristic.

Activity	1 – 2	1 – 3	2 – 4	3 – 4	2 – 5	4 – 5
Time (Days)	13	12	2	8	15	2

   1) Construct Network Diagram.

   2) Compute the earliest event time.

   3) Determine the critical path and total project duration.

SECTION – C

III. Answer **any four** questions. **Each** question carries **8** marks.   (4×8=32)

13) Solve the following LPP by simplex method.   8

   Maximize $Z = 2x_1 + 2x_2 + 4x_3$

   Subject to $2x_1 + 3x_2 + x_3 \leq 240$

   $x_1 + x_2 + 3x_3 \leq 300$

   $x_1 + 3x_2 + x_3 \leq 300$

   where $x_1, x_2, x_3 \geq 0$

14) a) Write the steps to find initial basic feasible solution by matrix minima method.   4

   b) Consider the job of assigning 5 jobs to 5 persons. Find the assignment cost from the table.   4

$$
\begin{array}{c|ccccc}
  & 1 & 2 & 3 & 4 & 5 \\
\hline
A & 8 & 4 & 2 & 6 & 1 \\
B & 0 & 9 & 5 & 5 & 4 \\
C & 3 & 8 & 9 & 2 & 6 \\
D & 4 & 3 & 1 & 0 & 3 \\
E & 9 & 5 & 8 & 9 & 5 \\
\end{array}
$$

15) a) Compare between assignment problem and transportation problem.   4

   b) Difference between PERT and CPM.   4

16) a) Explain the following Fairgame, Strategy.   2

     b) Solve the game whose pay off matrix is given by   6

$$
\begin{array}{c}
\text{Player B} \\
\begin{array}{ccc}
B_1 & B_2 & B_3
\end{array}
\end{array}
$$

$$
\text{Player A} \quad
\begin{array}{c}
A_1 \\
A_2 \\
A_3
\end{array}
\begin{vmatrix}
1 & 3 & 1 \\
0 & -4 & -3 \\
1 & 5 & -1
\end{vmatrix}
$$

17) a) Write the general rule of dominance property.   4

     b) Use the Dominance principle to solve the following game.   4

A \ B	I	II	III
I	1	7	2
II	6	2	7
III	6	1	6

18) A project consists of the following activities and time estimates.   8

Activity	Least Time	Greatest Time	Most Likely Time
1 – 2	3	15	6
2 – 3	2	14	5
1 – 4	6	30	12
2 – 5	2	8	5
2 – 6	5	17	11
3 – 6	3	15	6
4 – 7	3	27	9
5 – 7	1	7	4
6 – 7	2	8	5

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