**B.Sc. DEGREE EXAMINATION, APRIL 2017.**

**III YEAR — VI SEMESTER**

**ELECTIVE PAPER III — OPERATIONS RESEARCH**

**Time : 3 hours Max. Marks : 75**

**SECTION A — (10 × 2 = 20 marks)**

**Answer any *TEN* questions.**

1. Write the mathematical formulation of LPP.
2. Define Optimal solution.
3. Define Objective function.
4. Write the Characteristics of canonical form.
5. Define Degeneracy transportation problem.
6. Define balanced and unbalanced assignment problem.
7. Define Total elapsed time.
8. Define Idle time.
9. Define critical path.
10. Define Optimistic time estimate.
11. Define artificial variable.
12. Define No passing rule.

**SECTION B — (5 × 5 = 25 marks)**

**Answer any *FIVE* questions.**

1. Explain Main phases of OR.
2. Solve the following LPP by simplex method: Minimize *z=8x1 – 2x2*

 

1. Find IBFS by using North-West corner rule

 supply

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2 | 11 | 10 | 3 | 7 |
| 1 | 4 | 7 | 2 | 1 |
| 3 | 9 | 4 | 8 | $$^{1}/\_{2}$$ |

|  |
| --- |
| 4 |
| 8 |
| 9 |

 Demand 3 3 4 5 6

1. Find the sequence that minimizes the total elapsed time required to complete the following tasks on the machines in the order 1-2-3 . Find also the minimum total elapsed time (hrs) and the idle times on the machines.

 Task A B C D E F G

Time on

Machine 1 3 8 7 4 9 8 7

Machine 2 4 3 2 5 1 4 3

 Machine 3 6 7 5 11 5 6 12

[P.T.O.]

1. Draw the network , find the critical path and determine the expected standard deviation of the completion time.

 Activity 1 – 2 1 – 3 1 – 4 2 – 4 2 – 5 3 – 5 4 – 5

 a 2 3 4 8 6 2 2

 m 4 4 5 9 8 3 5

 b 5 6 6 11 12 4 7

1. Solve the assignment problem: Jobs

 1 2 3 4 5

 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

1. List out the differences between CPM and PERT.

**SECTION C — (3× 10 = 30 marks)**

**Answer any *THREE* questions.**

1. Apply graphical method to solve the LPP.

 Minimize z = $x\_{1}-2x\_{2.}$

 Sub to $ -x\_{1}+ x\_{2}\leq $ 1

 $6x\_{1}+4x\_{2}\geq 24$ $ $

$ 0\leq x\_{1}\leq 5 and 2\leq x\_{2}\leq 4 $

1. Using Big-M method to solve Minimize *z = x1 -2x2*

Sub to $-2x\_{1}+ x\_{2}\geq 1$

 $-3x\_{1}+2x\_{2}\leq 6$ $ $

$ x\_{1}+x\_{2}\geq 6 and x\_{1}x\_{2}\geq 0. $

1. Find the optimal transportation cost of the following matrix using least cost method for finding the critical solution.

 Market Available

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 4 | 1 | 2 | 6 | 9 | 100 |
| 6 | 4 | 3 | 5 | 7 | 120 |
| 5 | 2 | 6 | 4 | 8 | 120 |

 Requirements 40 50 70 90 90

1. Solve the following sequencing problem giving an optimal solution if passing is not allowed.

 Machines

M1  M2  M3 M4

 A 13 8 7 14

 Jobs B 12 6 8 19

 C 9 7 8 15

 D 8 5 6 15

1. Draw the network, find critical path, project duration and floats from the following activities.

 Activity : 1 – 2 1 – 3 1 – 5 2 – 3 2 – 4 3 – 4 3 – 5 3 – 6 4 – 6 5 – 6

 Duration

 (in weeks) : 8 7 12 4 10 3 5 10 7 4

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