National Institute of Technology Tiruchirappalli

Department of Mathematics

July 2023 Session - B.Tech IInd Year (CSE) - A-section

Probability and Operations Research - MAIR31 - Assessment-II

Date: 03.11.2023 Duration: 1 Hour Max. marks: 20

Attempt all the five questions.

1. Consider the transportation problem: [4]

1	2	3	6	30
7	6	2	5	50
4	3	2	7	35
15	30	25	45	

Starting with a basic solution $x_{11} = 15, x_{12} = 15, x_{23} = 25, x_{24} = 25, x_{32} = 15, x_{34} = 20$, find an optimum solution.

2. Use Hungarian method to solve the assignment problem: [3]

4	4	7	3	8
5	4	7	2	7
5	7	8	4	9
6	5	5	2	5
5	6	9	5	9

3. Consider a project consisting of nine activities $(A, B, \cdots, I)$ with the following precedence relations and time estimates: [5]

Activity	Immediate Predecessor(s)	Duration (Days)
A	–	23
B	–	8
C	–	20
D	A	16
E	A	24
F	B, D	18
G	C	19
H	B, D, G	4
I	A, F	10

(a) Draw the project network with 7 nodes.

(b) Determine the earliest completion time of the project and identify the critical path.

[P.T.O]

4. A company has 4 machines A, B, C and D manufacturing bulbs. The machine A, B, C, D produce 50%, 25%, 15% and 10% bulbs respectively. The percentages of defective bulbs produced by the machines A, B, C and D are 2% , 1%, 1% and 0.5% respectively . Out of the output, one bulb is chosen at random and is found to be defective. What is the probability that it is manufactured by the machine B? [4]

5. From a bag containing 4 white and 6 red balls, three balls are drawn at random. Find the probability distribution of the number of white balls drawn and the expected number of white balls drawn. [4]

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