

**MASTER OF ARTS EXAMINATION, 2025**  
**(2<sup>nd</sup> Year, 3<sup>rd</sup> Semester)**  
**ECONOMICS (Honours)**  
**Course : ECO/PG/312/2025**  
**( Operations Research )**

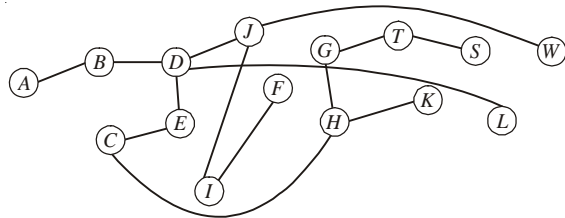
Time : Two Hours

Full Marks : 30

Answer any **three** questions :

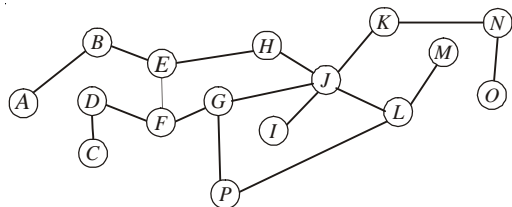
10×3=30

1. (a) Define a tree. Check whether the following network is a tree or not. Give reasons for your answer.



2+2

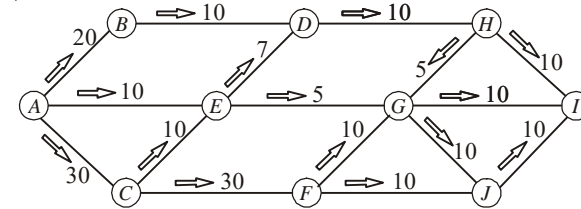
- (b) Define a complete bipartite network. Check whether the following network is a bipartite network or not. Give reasons for your answer.



2+4

( 2 )

2. Find out first three breakthrough paths from the following network using maximum flow algorithm.



10

3. Find out the fundamental matrix, time to absorption and probability of absorption from the Markov chain represented by following one-step transition probability matrix.

$$P = \begin{matrix} & \begin{matrix} A & B & C & D & E \end{matrix} \\ \begin{matrix} A \\ B \\ C \\ D \\ E \end{matrix} & \begin{bmatrix} 0.2 & 0.2 & 0 & 0.1 & 0.5 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0.1 & 0.3 & 0.2 & 0.1 & 0.3 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{matrix}$$

4+2+4

4. Solve the following problem.

$$\text{Maximise } Z = X_1 + 2X_2$$

$$\text{Subject to } 5X_1 + 2X_2 \leq 8$$

$$2X_1 + 5X_2 \leq 6$$

and  $X_1, X_2 \geq 0$  and are integers.

(Stop after 7 tables, if the problem is not solved till then). 10

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