MASTER OF TELE-COMMUNICATION ENGINEERING EXAMINATION, 2024
(1st year, 2nd Semester)

DISTRIBUTED PROCESSING & NETWORKING

Time : Three Hours | Full Marks : 100

Answer ***any five*** questions.

1. a) Consider a matrix multiplication problem **Ax = b** in which **A** is a 4x4 matrix and **x** and **b** are both 4x1 matrices. Obtain the dependency graph for the problem and map the problem onto a parallel architecture. Estimate the overall speedup also. 10

b) A multicomputer with 256 CPUs is organized as a hypercube. What is the worst-case delay (in hops) that a message might have to take? 2

c) Due to bugs, an experimental file server is up ¾ of the time and down ¼ of the time. How many times does this file server have to be replicated to give availability of at least 99 percent? 4

d) Write short notes on Clos networks. 4

2. a) Discuss with an example, a sender initiated distributed heuristic algorithm for processor allocation in a distributed system. 10

b) Discuss the up-down algorithm for processor allocation in a distributed system. 10

3. a) What do you mean by a physical clock? What is UTC? What is resynchronization interval? Obtain an expression for resynchronization interval. 2+2+2+4

b) What is a vector clock? Calculate the vector times of the ten events **a – j** shown in Fig. 1. Use the vector times to demonstrate that **(d, h)** are concurrent events, but event **f** is causally ordered before **e**. 2+6+2

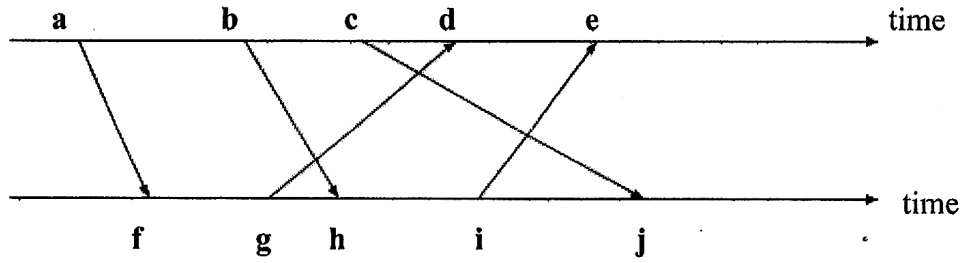

Fig. 1

4. a) What is a real-time system? Write the characteristics of different types of real-time systems. 3+7

b) Discuss the Earliest Deadline First (EDF) algorithm for real-time systems. Schedule the following processes using the EDF algorithm. 10

Process	Execution Time	Period (Deadline)
P1	1	3
P2	1	4
P3	1	12

5. a) Discuss Ricart and Agrawal's algorithm for the implementation of critical sections in a distributed system. 10

b) Discuss the Chang and Roberts algorithm for coordinator election in a distributed system. 10

6. Discuss in detail how distributed algorithms can be represented. 20