

MASTER OF TELE-COMMUNICATION ENGINEERING EXAMINATION, 2018
(2nd Semester)

DISTRIBUTED PROCESSING & NETWORKING

Time : Three Hours

Full Marks : 100

Answer any *five* questions.

1. a) What is a distributed system? How does it differ from a computer network? 5
- b) Discuss the advantages and disadvantages of distributed systems. 10
- c) An experimental file server is up $\frac{3}{4}$ of the time and down $\frac{1}{4}$ of the time, due to bugs. How many times does this file server have to be replicated to give an availability of at least 99 percent? 5

2. a) Discuss with an example, a sender initiated distributed heuristic algorithm for processor allocation in a distributed system. 10
- b) Consider a matrix multiplication problem $\mathbf{Ax} = \mathbf{b}$ in which \mathbf{A} is a 4×4 matrix and \mathbf{x} and \mathbf{b} are both 4×1 matrices. Obtain the dependency graph for the problem and map the problem onto a parallel architecture. Estimate the overall speedup also. 10

3. a) Calculate the vector times of the ten events $\mathbf{a} - \mathbf{j}$ shown in Fig. 1. Use the vector times to demonstrate that (\mathbf{d}, \mathbf{h}) are concurrent events, but event \mathbf{f} is causally ordered before \mathbf{e} . Mention the main advantage and disadvantage of a vector clock. 10

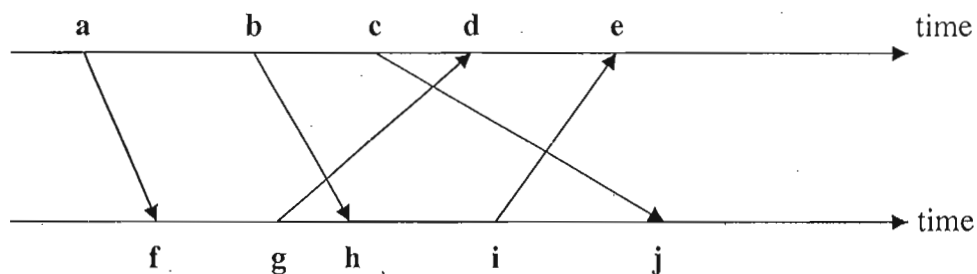


Fig. 1

- b) Describe Berkeley algorithm for physical clock synchronization and mention its advantages and disadvantages. 6+4

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 EDF algorithm. 10

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

5. a) Discuss a distributed algorithm for implementation of critical sections in a distributed system. 10

b) Discuss the Ring algorithm for coordinator election in a distributed system. 10

6. a) A conversation in a wireless ad-hoc network is severely disturbed by interference signals according to a Poisson process of rate $\lambda = 0.1$ per minute. i) What is the probability that no interference signals occur within the first two minutes of the conversation? ii) Given that the first two minutes are free of disturbing effects, what is the probability that in the next minute precisely one interfering signal disturbs the conversation? 5 + 5

b) Given the transition probability matrix P,

$$P = \begin{bmatrix} 0.8 & 0.2 \\ 0.4 & 0.6 \end{bmatrix}$$

Draw the Markov chain and compute the steady-state vector. 4

c) Discuss the Distance vector routing protocol. 6