B. Tech.
(SEM. VIII) EXAMINATION, 2006-07
DISTRIBUTED SYSTEM

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions.

1 Attempt any four parts of the following : \(5 \times 4 = 20\)

(a) Explain briefly all of the key characteristics of a distributed system.

(b) How are the resources made available to the users in distributed system? Explain the strategies - Data Migration, Computation Migration and Distributed scheduling.

(c) Discuss the models for structuring various components of an operating system. What are the major differences in monolithic kernel, collective kernel structure and object oriented operating system.

(d) Differentiate logical and vector clocks. What are the limitations of Lampert's logical clock?

(e) Enlist requirements of distributed mutual exclusion algorithms. How performance of
distributed mutual exclusion algorithms are measured? Discuss the central approach to achieve mutual exclusion in distributed system.

(f) Consider the following time-space diagram:

State with reasons if following global states are consistent global state or transitless global state or strongly consistent global state:

(i) \( \{LS_{11}, LS_{22}, LS_{33}, LS_{12}\} \)

(ii) \( \{LS_{13}, LS_{22}, LS_{34}, LS_{42}\} \)

(iii) \( \{LS_{13}, LS_{22}, LS_{34}, LS_{42}\} \)

2 Answer any four parts of the following: \( 5 \times 4 = 20 \)

(a) Differentiate communication deadlock and resource deadlock.

(b) What do you understand by Byzantine agreement problem? Show that Byzantine agreement cannot always be reached among four processors, if two processors are faulty.
(c) What are limitations of centralised deadlock detection? How it is overcomed in distributed deadlock detection?

(d) What are Phantom deadlocks? Under, what circumstances are the Phantom deadlocks reported?

(e) Explain Ho Ramamoorthy algorithms of centralised deadlock detection.

(f) Write on classification of agreement problems and in what way, consensus problem is different than other problems in distributed systems.

3 Attempt any two parts of the following: \( 10 \times 2 = 20 \)

(a) Explain the working of remote method invocation. Compare and contrast remote method invocation and remote procedure call.

(b) Give a general model of public digital signature system. Comment role of public and private keys in a cryptographic system.

(c) What do you understand by Network file sytem (NFS)? Clearly state the following features of NFS:

(i) Stateless server
(ii) Virtual file system.

VB-1039] 3 [Contd...
4 Attempt any two parts of the following: \[ 10 \times 2 = 20 \]
(a) What are vertical and horizontal fragmentation in distributed database? Consider the relation employee (employee_no, name, address, salary). Show that vertical and horizontal fragmentation of relation "employee".
(b) Compare the locking based concurrency control algorithm with time-stamp based concurrency control algorithm.
(c) Define fault tolerance. Describe in brief, the methods to guard the system against different kinds of faults.

5 Attempt any two parts of the following: \[ 10 \times 2 = 20 \]
(a) Explain any token-based distributed algorithm.
(b) What are wave algorithms? Discuss its usage and applications.
(c) (i) Describe election algorithm
(ii) Explain destination based routing.