

## C12-R3: DISTRIBUTED SYSTEMS

### NOTE:

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) Resource sharing is the main motivating factor for constructing distributed system. Explain the terms: heterogeneity and concurrency.
  - b) 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 has to be replicated, given an availability of atleast 99%.
  - c) What is the role of middleware in a distributed system?
  - d) Discuss the advantages of web servers as multi-tiered client server system.
  - e) Why do DNS (Domain Name System) servers hold entries for two-level names such as *yahoo.com* and *engineering.edu*, rather than one-level names such as *edu* and *com*?
  - f) List the differences between TCP and UDP protocols?
  - g) Once a security policy has been laid down, it becomes possible to concentrate on the security mechanisms by which a policy can be enforced. List some of these security mechanisms.

**(7x4)**
2.
  - a) What is the main difference between a remote method invocation (RMI) and Remote Procedure Call (RPC)?
  - b) A service is implemented by several servers. Explain why resources that might be transferred between them. Would it be satisfactory for clients to multicast all requests to the group of servers as a way of achieving mobility transparency for clients?

**(9+9)**
3.
  - a) Strictly speaking Sun Network File System (NFS) may not be termed as a file system. Comment.
  - b) Why is replication provided in distributed file systems? Suggest two methods of file replica updation.
  - c) Give an example of 3-tiered client-server architecture.

**(5+8+5)**
4.
  - a) In the context of mutual exclusion, describe the centralized algorithm. List the shortcomings of the centralized approach.
  - b) A single point of failure is frequently unacceptable and for this one looks for mutual exclusion algorithms. Discuss one such algorithm in detail.
  - c) Explain the principle of a page-based distributed shared memory system.

**(5+8+5)**

**5.**

- a) What is concurrency control and what are the various methods of concurrency control? Which of these may lead to deadlock and why?
- b) Explain how Lamport's way of adjusting logical clocks works.

**(10+8)**

**6.**

- a) Compare a stateless file server with a stateful file server in a distributed system.
- b) Differentiate between a nested and distributed transaction?
- c) What is the essential difference between caching and replication?

**(8+6+4)**

**7.**

- a) Give an example of a complex continuous data stream, and explain how synchronization in such a stream is generally accomplished.
- b) Public-key cryptosystems are claim to scale better than shared-key cryptosystems. Does this claim really hold? Justify your answer.
- c) What type of transmission is generally used for multimedia streaming and why?

**(8+6+4)**