

[This question paper contains 3 printed pages.]

Your Roll No.

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MECTA

COMPUTER TECHNOLOGY AND APPLICATIONS

Paper—CS.603

Distributed Computing

Time : 3 Hours

Maximum Marks : 100

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt any five questions.

Assume missing data, if any.

All questions carry equal marks.

1. (a) Give a simple solution for synchronizing clocks in a local-area distributed system. 10
- (b) With asynchronous RPCs, a client is blocked until its request has been accepted by the server. To what extent do failures affect the semantics of asynchronous RPCs. 10
2. (a) Consider the behaviour of two machines in a distributed system. Both have clocks that are supposed to tick 1000 times per millisecond. One of them actually does but the other ticks only 990

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- times per millisecond. If UTC updates come in once a minute, what is the maximum clock skew that will occur ? 10
- (b) Explain the difference between a process virtual machine and a virtual machine monitor. 10
3. (a) Explain the reasons for considering weak consistency model. What is meant by sequential consistency ? 8
- (b) A file is replicated on 10 servers. List all the combinations of read quorum and write quorum that are permitted by the voting algorithm. 12
4. (a) Explain centralised and distributed algorithms for mutual exclusion in distributed systems. 6
- (b) What are the QoS requirements for data streams. 6
- (c) Explain the role of message brokers in message oriented communication. 8
5. (a) Explain why transient synchronous communication has inherent scalability problems, and how these could be solved. 10
- (b) Consider a process P that requires access to file F which is locally available on the machine where P is currently running. When P moves to another machine, it still requires access to F. If the file-to-machine binding is fixed, how could be system wide reference to F be implemented ? 10

- 6. (a) What is the role of middleware in distributed systems ? 8
- (b) Describe Hierarchical approach for flat Naming system. 12
- 7. Describe various election algorithms for electing a coordinator in distributed system. 20
- 8. (a) Describe Pull and Push protocols for replica management in distributed systems. 10
- (b) Explain how name resolution works in Chord by resolving $k = 30$ starting from node 21 in the following example. Do the same for $k = 19$ from node 21. 10

