



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech(CSE)/SEM-2/MCS-203/2011

2011

DISTRIBUTED COMPUTER SYSTEMS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

10 × 1 = 10

- i) In a distributed system Processors and Memory modules can be interconnected by
 - a) CPU – Memory internal bus
 - b) Switches
 - c) LAN
 - d) all of these.
- ii) In a Multiprocessor environment & bus based architectures, the speed of communication among CPUs is maximum for
 - a) NUMA
 - b) NORMA
 - c) UMAd)
 - d) same for all.



iii) A UMA architecture can be categorized as

- a) MIMD
- b) MISD
- c) SIMD
- d) SISD.

iv) The No. of messages in the network is maximum for

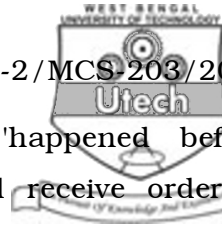
- a) lazy release consistency
- b) sequential consistency
- c) entry consistency
- d) same for all.

v) A high level synchronization mechanism is provided by

- a) sitrict consistency
- b) sequential consistency
- c) barrier
- d) all of these.

vi) Chandy-Misra-Haas algorithm is used in a distributed environment for

- a) ensuring critical section access
- b) selecting distributed co-ordinator
- c) detecting distributed deadlock
- d) transaction processing.



- vii) Lamport's algorithm implements, 'happened before relationship' for message send and receive ordering according to
- a) global clock (UTC)
 - b) real time clock
 - c) logical clock
 - d) none of these.
- viii) In a distributed environment, the most difficult consistency model to implement is
- a) causal consistency
 - b) strict consistency
 - c) sequential consistency
 - d) release consistency.
- ix) A two-phase commit protocol refers to
- a) detection of termination of a distributed algorithm
 - b) critical section access
 - c) clock synchronization
 - d) transaction processing.
- x) For running a parallel algorithm transparently on a NORMA system it is essential to have a
- a) DSM
 - b) virtual memory system
 - c) paging system
 - d) all of these.



GROUP – B

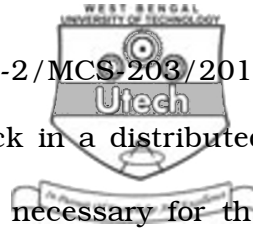
(Long Answer Type Questions)

Answer any *five* of the following.

5 × 12 = 60

2. a) Explain the concept of scalability in a distributed system. What are the basic principles to make a distributed system scalable ? 6
- b) How do you propose to implement location transparency to a file in a distributed system ? 6
3. a) Explain how distributed shared memory using page as a basic unit can be implemented in a NORMA environment. 5
- b) In a NUMA environment if a given read-only page is used frequently by two different processors, what decision the memory management will take regarding the placement of the page ? 5
- c) "An invalidation protocol in a paging system works more efficiently compared to an updation protocol". Justify.

2



4. a) What is the utility of the Logical clock in a distributed system ? What are the assumptions necessary for the synchronization of Logical clocks ? 2 + 4
- b) Explain how RPC uses the "Copy – Restore" mechanism to Marshall parameters where the word size for the *rpc* server and *rpc* client are different. 3
- c) Explain with example how a transaction processing is implemented efficiently using private workspace. 3
5. a) Describe two methods by which load measurement of a CPU can be carried out. Describe advantages and disadvantages of each method. 4
- b) Describe an efficient load balancing mechanism which utilizes process migration from one CPU to another. Why do you consider it efficient ? 5
- c) From what viewpoint do you think that a sub-optimal load balancing algorithm performs better than an optimum algorithm ? 3



6. a) What is the difference between true global state and meaningful global state ? 4
- b) In absence of global time how is meaningful global state obtained from a collection of local states recorded at different real times ? 4
- c) State the principles involved. 4
7. a) Describe Ricart – Agarwala's algorithm and its purpose. 5
- b) In case of failure of a node, in the above algorithm how can the system recover ? 3
- c) Describe an algorithm which is used to synchronize a local clock with UTC. Describe the limitations inherent in the algorithm. 4
8. a) Describe the architecture of Network File System.
How can a user access a file which is located at a distant server ? 7
- b) Describe the centralized algorithm for detecting distributed deadlock, its drawbacks and remedies. 5



9. a) Describe the principles behind the design of fault tolerant systems. 5

b) Describe a fault tolerant paradigm where a faulty system generates wrong information but still continues to function. 7

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