Printed Page:- Subject Code:- AMICA0604

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA (Integrated)

SEM: VI - THEORY EXAMINATION (20..... - 20.....)

Subject: Distributed System

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. Group communication involves sending messages to multiple recipients.(CO1,K1) 1

(a) Unicast

(b) Loopback

(c) Multithread

(d) Group communication

1-b. Multicast is used to send a message to a group of recipients.(CO1,K1) 1

(a) Broadcast

(b) Unicast

(c) Multicast

(d) Serialcast

1-c. Threads are.....(CO2,K1) 1

(a) lightweight processes

(b) independent systems

(c) communication layers

(d) file descriptors

1-d. Kernel is a core component of.....(CO2,K1) 1

(a) hardware

(b) application

(c) middleware

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(d) operating system

1-e. Logical clocks are used to order _____ in a system.(CO3,K1) 1

(a) hosts
(b) processes
(c) events
(d) services

1-f. Clock synchronization is important in _____ systems.(CO3,K1) 1

(a) distributed
(b) local
(c) embedded
(d) mobile

1-g. Executes as a single unit. (CO4,K2) 1

(a) Replication
(b) Flat transaction
(c) Nested transaction
(d) Recovery

1-h. Forms a wait-for cycle.(CO4,K2) 1

(a) Deadlock
(b) WAL
(c) DSM
(d) Flat transaction

1-i. Shared memory model supports this method (CO5,K1) 1

(a) Signal passing
(b) Broadcast
(c) Socket linking
(d) Shared variables

1-j. Main challenge in mutual exclusion (CO5,K2) 1

(a) Prevent simultaneous access
(b) Ensure fairness
(c) Delay messages
(d) Assign memory blocks

2. Attempt all parts:-

2.a. List key features of the architectural model of a distributed system.(CO1,K1) 2

2.b. Discuss the responsibilities of processes and threads in distributed computing. (CO2,K2) 2

2.c. Define the concept of redundancy in distributed systems. (CO3,K1) 2

2.d. Provide two advantages of data replication.(CO4,K1) 2

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2.e.	Describe the importance of MIS in distributed graph coloring. (CO5,K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain the client-server model and identify components involved in its communication cycle.(CO1,K2)	6
3-b.	Discuss group membership and coordination in multicast systems with suitable example.(CO1,K3)	6
3-c.	Define cryptographic algorithms and differentiate between symmetric and asymmetric types.(CO2,K1)	6
3-d.	Discuss the role of marshalling and unmarshalling in RPC communication with suitable example.(CO2,K3)	6
3.e.	Explain the role of caching in distributed file systems also discuss that how does caching improve the performance of file access in distributed systems.(CO3,K3)	6
3.f.	Describe the phases of the two-phase commit protocol with a diagram. (CO4,K2)	6
3.g.	Explain the role of shared registers and atomic operations in ensuring correctness. (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explore fault-detection and recovery mechanisms for achieving high availability with suitable example.(CO1,K3)	10
4-b.	Compare interprocess communication using sockets, message queues, and shared memory with suitable example.(CO1,K2)	10

5. Answer any one of the following:-

5-a.	Explain the architecture of an operating system suited for distributed computing with proper diagram.(CO2,K2)	10
5-b.	Discuss digital signatures and their use in securing data integrity and authentication with suitable example. (CO2,K3)	10

6. Answer any one of the following:-

6-a.	Discuss the importance of clocks in distributed systems with suitable example also explain that how do synchronized clocks help in ensuring proper coordination among distributed processes.(CO3,K3)	10
6-b.	Explain the concept of distributed debugging with suitable example also discuss the challenges arise in debugging distributed systems compared to centralized systems.(CO3,K3)	10

7. Answer any one of the following:-

7-a.	Analyze the challenges of concurrency control in distributed transactions with suitable example.(CO4,K3)	10
7-b.	Discuss the role of locks in ensuring consistency and avoiding anomalies with suitable example.(CO4,K3)	10

8. Answer any <u>one</u> of the following:-

8-a.	Analyze a distributed algorithm for MIS with respect to convergence and correctness. (CO5,K3)	10
8-b.	Analyze the use of I/O automata in modeling and proving properties of distributed algorithms.(CO5,K3)	10

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