BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – M.Tech.(CSE)-AIML-2024
Course Name – Operating Systems and Virtualization
Course Code - MTA10104
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the advantage of using a multi-processor system.
a) Faster disk I/O
b) Improved reliability and performance
c) Lower power consumption
d) Simplified system architecture

(ii) Select Correct option: Inter-Processor Interrupts (IPI) in multi-processor systems are used to_____
a) Switch tasks between processors
b) Allow one processor to interrupt another for communication or task coordination
c) Transfer control of memory management between processors
d) Handle input/output operations between processors

(iii) Identify the technique to avoid the deadlock in a distributed system.
a) Preemptive Scheduling
b) Time Stamps
c) Token Passing
d) Priority Inversion

(iv) Identify the protocol that is commonly used for communication in distributed systems
a) TCP/IP
b) ARP
c) Ethernet
d) CSMA/CD

(v) Choose factor that is the most crucial for video streaming in a multimedia file system.
a) High storage capacity
b) Low disk fragmentation
c) Low latency and high data throughput
d) Data compression techniques

(vi) Choose correct option: File migration of a Distributed File System typically occurs in____
a) A node becomes unavailable
b) The system needs to balance load across servers
c) Cache coherence is violated
d) Files need to be deleted from the system

(vii) Choose primarily used techniques to reduce power consumption in mobile devices.
a) Overclocking the CPU
b) Increasing screen brightness

c) Using multiple active SIM cards
d) Dynamic Voltage and Frequency Scaling (DVFS)

(viii) Choose concurrency control algorithms that uses timestamps to order transactions.

a) Two-phase locking (2PL)
b) Timestamp ordering
c) Optimistic concurrency control
d) Multiversion concurrency control (MVCC)

(ix) Select true statement about deadlocks.

a) Deadlocks occur only in single-user database systems.
b) Deadlocks can be avoided using the two-phase locking protocol.
c) Deadlocks are always caused by hardware failure.
d) Deadlocks are resolved by scheduling transactions in a random order.

(x) Choose the method to prevent concurrent transactions from accessing the same data in a database.

a) Indexing
b) Locking
c) Caching
d) Sorting

(xi) Select a type of locking mechanism that is NOT applicable in database management.

a) Shared lock
b) Exclusive lock
c) Recursive lock
d) Intent lock

(xii) Select the method used to detect deadlocks in database systems.

a) Time stamping
b) Wait-for graph
c) Optimistic concurrency control
d) Rollback

(xiii) Choose concurrency control algorithm that allows transactions to proceed without locking resources but checks for conflicts at the end of the transaction.

a) Two-phase locking
b) Time-stamp ordering
c) Optimistic concurrency control
d) Strict two-phase locking

(xiv) Identify key challenge to implement virtual memory in a multiprocessor environment.

a) Handling multiple cache hierarchies
b) Process synchronization
c) Maintaining TLB coherence
d) Managing shared memory regions

(xv) Select main advantage of using a cache in a multiprocessor system.

a) Reduces memory usage
b) Decreases the number of processes
c) Increases CPU clock speed
d) Reduces memory access latency

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define consistency model in shared memory system. (3)
3. Write key requirements of a database operating system. (3)
4. Explain mutual exclusion in distributed operating system. (3)
5. Distinguish between ARM and Intel processors with respect of primary architecture in mobile devices. (3)
6. Explain the key components of a typical mobile operating system architecture. (3)

OR

In respect of native-level programming compare Android and iOS platforms. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Describe the various strategies used to handle deadlocks in distributed systems. (5)
8. Explain the role of the kernel in mobile operating systems to manage hardware resources. (5)
9. Compare and contrast pessimistic and optimistic concurrency control techniques in relation to their synchronization mechanisms. (5)
10. Differentiate between centralized and distributed transaction processing models. (5)
11. Explain common runtime issues faced by mobile applications. (5)

12. Explain working principle of multi-version concurrency control (MVCC) in contrast to locking mechanisms. (5)

OR

Explain the challenges associated with deadlock detection, prevention, and recovery in a Database OS. (5)

****