**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU -27**

**M.Sc. COMPUTER SCIENCE – IV SEMESTER**

**SEMESTER EXAMINATION: APRIL 2023**

**(Examination conducted in May 2023)**

**CS 0222: ADVANCED OPERATING SYSTEM**

**(For current batch students only)**

**Time: 2 ½ Hours Max Marks: 70**

**This paper contains THREE printed pages and THREE parts**

**PART A**

Answer **ALL** the following question.                   (15 x 1 = 15)

1. A situation where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which access takes place is called \_\_\_\_\_\_\_\_\_\_\_\_
2. Mention the conditions that must be satisfied to solve the critical section problem.
3. \_\_\_\_\_\_\_\_\_ implies that if a process is executing in its critical section, then no other process must be executing in their critical sections
4. How many processes can be active at a time within the monitor?
5. Semaphore is a/an \_\_\_\_\_\_\_ variable to solve the critical section problem.
6. Mention any one class of failure that can occur in RPC systems.
7. In RPC, while a server is processing the call, the client is blocked \_\_\_\_\_\_\_\_
8. If no cycle exists in the resource allocation graph \_\_\_\_\_\_\_\_\_\_\_\_
9. Which are the two complementary deadlock-prevention schemes using timestamps?
10. If the Lamport clock of event e1 is less than the Lamport clock of event e2, then there must be a chain of causal events by which e1 precedes e2. State whether the statement is true or false.
11. Which layer is the layer closest to the transmission medium?
12. In Distributed database, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the transactions for which a <ready T> log is found in the log file, but neither a <commit T> log nor an <abort T> log is found.
13. While using commit protocols for handling atomicity issues, the distributed database system may enter into a situation called Blocking problem. Which commit protocols can avoid Blocking problem?
14. Returning system to a state before an error occurred is \_\_\_\_\_\_\_\_\_
15. Because the kernel thread management is done by the Operating System itself

kernel threads are \_\_\_\_\_\_\_\_ to create than user threads

**PART B**

Answer the following questions.         (5 x 5 = 25)

1. Classify and explain the different types of operating system.

OR

What are the characteristics of a general resource system? Mention the operations on the general resource graph with a suitable example.

1. Explain Lamport's logical clock algorithm with a suitable example.

OR

Explain in detail Birman Schipper algorithm for casual ordering of messages.

1. What is the functionality of Name server and Cache Manager in the architecture of a distributed file system.

OR

How is the migration algorithm different from the central server algorithm? Justify.

1. Illustrate Orphan messages and the Domino effect with a neat diagrammatic representation.

OR

Summarize the components of Load Distribution algorithm.

1. Identify and interpret the various anomalous situations that may arise if the interleaving of actions is not controlled in an orderly manner in a Database system.

OR

What is the main objective of the full-replication algorithm? Explain the write operation in the full-replication algorithm.

**PART C**

Answer any **THREE** of the following questions.       (3 x 10 = 30)

1. a. Distinguish between policies and mechanisms with a suitable example.

b. What is a semaphore? Explain monitors. (4+6)

1. a. How do vector clocks extend the notion of Lamport’s logical clocks?

b. Write the suzuki- kazami’s broadcast algorithm. Explain with example. (3+7)

1. a. Demonstrate basic idea of a voting algorithm?

b. Explain the symmetrically initiated load distribution algorithm with a neat diagram. (2+8)

1. a. What is kernel-level threads. Discuss the advantages, disadvantages and performance implications of Kernel-level threads.

b. With a transaction example, explain two-phase locking scheme. (5+5)