

**ADVANCED OPERATING SYSTEM
(CSEN 4142)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

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

**Group - A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Two events that are correlated with happened Before Relation are called
(a) concurrent event (b) causal event
(c) synchronous event (d) all of these.
- (ii) In tightly coupled system the memory is
(a) centralized (b) shared
(c) distributed (d) private.
- (iii) Chandy-Lamport algorithm is used for
(a) global state recording (b) mutual exclusion
(c) resource sharing (d) none of these.
- (iv) Prefix table is associated with
(a) remote file (b) remote process
(c) naming (d) broadcasting.
- (v) In which of the following distributed mutual exclusion algorithms,
3(n-1) messages are required per CS invocation?
(a) Ricart-Agrawala's Algorithm (b) Lamport's Algorithm
(c) Maekawa Algorithm (d) None of these.
- (vi) Distributed OS works on which of the following principles?
(a) File foundation (b) Single system image
(c) Multi system image (d) Networking image.
- (vii) Phantom deadlock occurs in distributed system only when there is
(a) false path (b) false knot
(c) false cycle (d) none of these.

- (viii) In ____ OS, the response time is very critical.
- | | |
|------------------|----------------|
| (a) multitasking | (b) batch |
| (c) online | (d) real-time. |
- (ix) In distributed systems, a logical clock is associated with
- | | |
|----------------------|--------------------------|
| (a) each instruction | (b) each process |
| (c) each register | (d) none of the mention. |
- (x) If timestamps of two events are same, then the events are
- | | |
|----------------|--------------------|
| (a) concurrent | (b) non-concurrent |
| (c) monotonic | (d) non-monotonic. |

Group - B

2. (a) What are the difference between Network Operating system and Distributed Operating System?
- (b) Discuss the issues in designing a distributed operating system.
- (c) How is Suzuki-Kasami's broadcast algorithm different from Ricart-Agrawala's algorithm (in terms of message complexity and synchronization delay)?

4 + 4 + 4 = 12

3. (a) Compare the following types of systems in terms of cost, hardware, complexity, parallelism and programmability (how easily users can write efficient programs)
- (i) A multiprocessing system having a single shared memory.
 - (ii) A multiprocessing system in which each processor has its own local memory in addition to a shared memory used by all processes.
 - (iii) A multiprocessing system in which each processor has its own memory. All processors are kept in a big hall and are interconnected by a high capacity communication line forming a network. Each processor can communicate with others only by exchanging message.
- (b) A global state, GS, of a system is a collection of the local states of its sites, i.e., $GS = \{LS_1, LS_2, \dots, LS_n\}$, where n is the number of sites in the system and LS_i is a local state of site i. Define what it means to say that a global state is inconsistent. Give an example of such a state of a system consisting of three processes. Can this happen in a real distributed system? Justify your answer.

6 + 6 = 12

Group - C

4. (a) Explain the difference between communication deadlock and resource deadlock. What do you mean by phantom deadlock?
- (b) Write the edge chasing distributed deadlock detection algorithm for the AND model. With example show how the probe message propagation along each edge determine wheather any deadlock exists there or not.
- 6 + 6 = 12**
5. (a) State and explain difference between sender initiated and receiver initiated distributed scheduling algorithm.
- (b) Differentiate load balancing and load sharing. Why pre-emptive task transfer is expensive than non-preemptive task transfer?
- 6 + 6 = 12**

Group - D

6. (a) Write Migration algorithm and Full replication algorithm in DSM.
- (b) Explain Sequential consistency and processor consistency in distributed shared memory.
- 6 + 6 = 12**
7. (a) With diagram explain data access action in distributed file system.
- (b) What is mounting? Explain with diagram.
- (c) What is the role of name server and cache manager in file system?
- 4 + 4 + 4 = 12**

Group - E

8. (a) What is the basic concept of distributed file system? Describe how the access action between the client and server is taken.
- (b) Write notes on any two of the following multiprocessor architecture:
- (i) NUMA architecture
 - (ii) Hypercube architecture
 - (iii) Multistage architecture.
- 6 + 6 = 12**

9. (a) Differentiate between user-level threads and kernel-level threads.
- (b) Explain different types of real-time system.
- (c) State difference between RMA and EDF.

4 + 4 + 4 = 12