

**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) In distributed system each processor has its own
(a) local memory (b) clock
(c) both (a) and (b) (d) none of the mentioned.
- (ii) Wait-die scheme is a _____ scheme
(a) deadlock detection (b) deadlock prevention
(c) deadlock avoidance (d) deadlock recovery.
- (iii) If timestamps of two events are same, then the events are
(a) concurrent (b) non-concurrent
(c) monotonic (d) non-monotonic.
- (iv) A thread shares with other threads belonging to the same process of its
(a) code section and data section (b) other operating resources
(c) both (a) and (b) (d) none of these.
- (v) Critical Region is
(a) a code segment of a program that exclusive access to shared resource
(b) a high level synchronization construct
(c) a region of a program which is shared among other cooperative processes
(d) a region or portion of operating system used for handling critical situations.
- (vi) In distributed systems, a logical clock is associated with
(a) each instruction (b) each process
(c) each register (d) none of the mentioned.

- (vii) According to the Ricart-Agrawalla algorithm if P1 wants to execute the critical section and P2 is already executing in the critical section then P2 will reply to the request of P1,
(a) always (b) if time stamp of P1 < P2
(c) if time stamp of P1 > P2 (d) when P2 has finished.
- (viii) An $N \times N$ multistage interconnection network requires only _____ switches.
(a) $(N/2) \times \log_2 N$ (b) $N \times N$
(c) $N \times \log_2 N$ (d) none of these.
- (ix) A process P1 has a period of 50 and a CPU burst of $t_1 = 25$, P2 has a period of 80 and a CPU burst of 35. The total CPU utilization is :
(a) 0.90 (b) 0.94 (c) 0.74 (d) 0.80.
- (x) In rate monotonic scheduling
(a) shorter duration job has higher priority
(b) longer duration job has higher priority
(c) priority does not depend on the duration of the job
(d) none of the mentioned.

Group - B

2. (a) Explain different models of distributed system with examples.
(b) Explain different communication protocol used for RPCs.
8 + 4 = 12
3. (a) What are the difference between Network Operating system and Distributed Operating System?
(b) Briefly explain the different kinds of transparency properties desirable in a distributed system.
(c) Explain different types of message passing models of distributed system.
4 + 4 + 4 = 12

Group - C

4. (a) What are partial ordering and total ordering in distributed system?
(b) Briefly discuss about the Lamport's logical clock with example.
(c) What are the advantage of vector clock over Lamport's Logical clock, describe with examples.
4 + 4 + 4 = 12

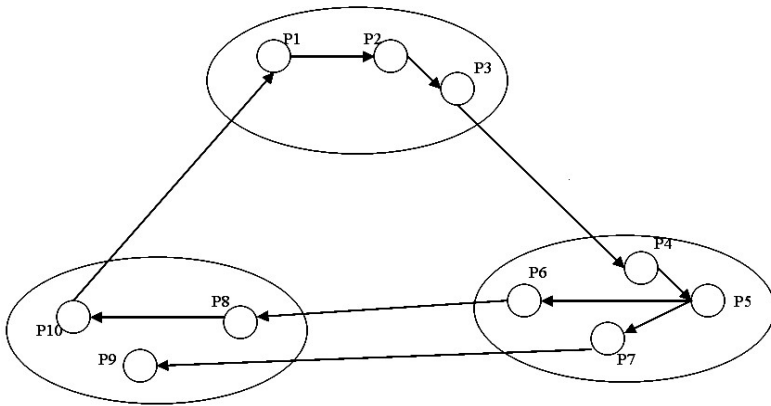
5. (a) What are the different conditions to be satisfied to construct request set in Maekawa's algorithm?
- (b) Explain Suzuki Kasami's Token Based Algorithm.
- (c) How this algorithm achieves mutual exclusion.

4 + 6 + 2 = 12

Group - D

6. (a) Consider 3 transaction T1, T2, T3 with:
 T1 initiated at site S1 and creating an agent at site S2.
 T2 initiated at site S2 and creating an agent at site S3.
 T3 initiated at site S3 and creating an agent at site S1.
 Apply Obermark's algorithm for distributed deadlock detection to this example.
 - (b) What is the different component of access matrix model of protection?
7. (a) Write the edge chasing distributed deadlock detection algorithm for the AND model. Show the probe message propagation along each edge for the following example and then determine any deadlock exists there or not.

8 + 4 = 12



- (b) Explain lock-key method of access control.

7 + 5 = 12

Group - E

8. (a) How mounting is done in DFS? What is name server?

- (b) What do you mean by hard real time system and soft real time system? What is periodic, aperiodic and sporadic job?

(4 + 3) + 5 = 12

9. Write short note on following topic (**any three**):

(3 × 4) = 12

- (i) User-level and Kernel Level threads
- (ii) Tightly coupled vs Loosely Coupled systems
- (iii) Birman-Schiper-Stephenson Protocol.
- (iv) Data access action in DFS
- (v) RTOS.