

T1 = (e1 = 10, p1 = 20), T2 = (e2 = 5, p2 = 50), T3 = (e3 = 10, p3 = 40).
Determine whether the task set is schedulable.

- (c) Explain the reference model of RTOS with diagram.

3 + 3 + 6 = 12

**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 a logical clock is assigned with
(a) each instruction (b) each processor
(c) each process (d) none of the mentioned.
- (ii) If timestamps of two events are same, then the events are
(a) Concurrent (b) Non-concurrent
(c) Monotonic (d) Non-monotonic.
- (iii) Ho-Ramamoorthy One phase algorithm uses how many status table
(a) One (b) Two (c) Three (d) Four.
- (iv) Statement 1: Lamport's algorithm achieves mutual exclusion.
Statement 2: Maekawa's algorithm does not achieve mutual exclusion.
Which of the above statement is correct?
(a) Statement (1) (b) Statement (2)
(c) Both statement (1) and (2) (d) None of the statement.
- (v) What are the characteristics of fully distributed approach?
(i) When responses are received from all processes, then process can enter its Critical Section
(ii) When process exits its critical section, the process sends reply messages to all its deferred requests
(iii) It requires request, reply and release per critical section entry
(iv) One processor as coordinator which handles all requests
(a) (i) (b) (i) and (ii)
(c) (ii) and (iii) (d) (iii) and (iv).

- (vi) Suppose in a distributive system there are n numbers of processes. Then total number of messages per entry/exit required in the distributive approach for mutual exclusion is
 (a) $2(n-1)$ (b) 3 (c) $(n-1)$ (d) infinity.
- (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) The primary goal of distributed file system is
 (a) network transparency (b) location transparency
 (c) access transparency (d) all of these.
- (ix) What are the characteristics of tightly coupled system?
 (i) Different clock (ii) Use communication links
 (iii) Same clock (iv) Distributed systems
 (a) (i) (b) (i) and (iv)
 (c) (i), (ii) and (iii) (d) (ii), (iii) and (iv).
- (x) Which deadlock model is used for resource acquisition?
 (a) Single unit (b) AND
 (c) OR (d) AND-OR.

Group – B

2. (a) What are the advantages of distributed OS?
 (b) In message passing model what do you mean by blocking and non blocking primitives?
 (c) What are the different semantics of RPC?
 $4 + 5 + 3 = 12$
3. (a) What is marshalling in remote procedure call?
 (b) What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in a microkernel architecture?
 (c) Explain how failure is handled in RPC.
 $2 + (2 + 2) + 6 = 12$

Group – C

4. (a) What is Transittless global state? What is consistent global state and what is strongly consitant global state?

- (b) How vector clock concept resolve the limitation of Lamport's logical clock? Explain with proper diagram and example. Write Birman-Schipher-Stephenson protocol. What type of clock is applied in this protocol?
 $3 + (4 + 4 + 1) = 12$
5. (a) What are partial ordering and total ordering in a distributed system?
 (b) Explain a token based algorithm for distributed mutual exclusion. What metrics are used for measuring the performances of different distributed mutual exclusion algorithms?
 $2 + (7 + 3) = 12$
- Group – D**
6. (a) What is phantom deadlock?
 (b) Distinguish between a AND request model and a OR request model of deadlocks.
 (c) With a suitable example briefly describe the Chandy-Misra-Hass deadlock detection algorithm.
 $2 + 3 + 7 = 12$
7. (a) Describe access matrix model.
 (b) What are the three different techniques to implement the access matrix? Describe any one technique of your choice.
 $4 + (3 + 5) = 12$

Group – E

8. (a) What are the differences between stateless and stateful server.
 (b) What is name resolution? Compare absolute and relative names. How is naming service implemented in a distributed system that does not support object migration?
 (c) Draw the architecture of the Sun NFS.
 $2 + (3 + 4) + 3 = 12$
9. (a) Consider the following set of three periodic real-time tasks:
 $T1 = (5, 10)$, $T2 = (10, 30)$, $T3 = (20, 60)$ to be run on a uniprocessor. Determine whether the task set is schedulable under RMA.
 (b) Consider the following three periodic real-time tasks to be scheduled using EDF on a uniprocessor: