

B.TECH/CSE/7TH SEM/CSEN 4142/2018
ADVANCED OPERATING SYSTEM
(CSEN 4142)

Time Allotted : 3 hrs

Full Marks : 70

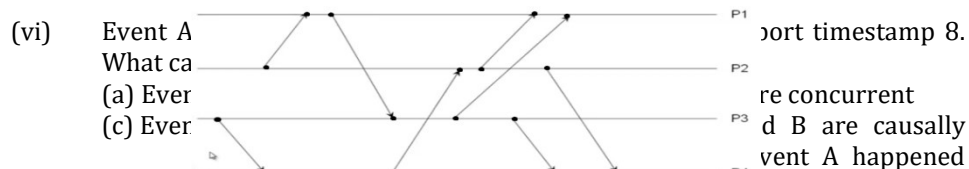
Figures out of the right margin indicate full marks.

*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) Critical region is
 - (a) a code segment of a program that has 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.
 - (ii) According to the wait-die method of deadlock prevention algorithm if P1 is holding the resource R1 and P2 is requesting the resource R1, then P2 waits
 - (a) always
 - (b) if timestamp of P1 < P2
 - (c) If timestamp of P1 > P2
 - (d) all of the above.
 - (iii) In distributed deadlock detection algorithm, presence of KNOT is the sufficient condition for detecting deadlock for which deadlock model.
 - (a) P-out-of-Q request model
 - (b) OR request model
 - (c) AND-OR request model
 - (d) all of the above.
 - (iv) In distributed system each processor has its own
 - (a) local memory
 - (b) clock
 - (c) both (a) and (b)
 - (d) none of the above.
 - (v) Which event is concurrent with the vector clock (2, 8, 4)?
 - (a) (3, 9, 5)
 - (b) (3, 8, 4)
 - (c) (1, 7, 3)
 - (d) (4, 8, 2).



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- (vii) In distributed system a logical clock is assigned with
 - (a) each instruction
 - (b) each processor
 - (c) each process
 - (d) none of the above.
- (viii) In deadline 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 above.
- (ix) What are not the characteristics of a DFS ?
 - (a) login transparency and access transparency
 - (b) files need not contain information about their physical location
 - (c) no multiplicity of users
 - (d) no multiplicity of files.
- (x) A process P1 has a period of 50 and a CPU burst of t1 = 25, P2 has a period of 80 and a CPU burst of 35. The total CPU utilization is :
 - (a) 0.90
 - (b) 0.74
 - (c) 0.94
 - (d) 0.80

Group - B

2. (a) Explain briefly about any four of the issues in designing distributed systems.
 (b) Explain briefly about message passing model.
 (c) Explain the differences between monolithic kernel structure and layered systems structure with examples.

4 + 4 + 4 = 12

3. (a) With space-time diagram explain the limitations of Lamport's logical clock. What are the different design issues for RPC? Explain at least two issues.
 (b) Explain the difference between user level threads and kernel level threads.

8 + 4 = 12

Group - C

4. (a) Write the Birman-Schiper-Stephenson protocol.
 (b) In the following space time diagram four processes are communicating with each other, each process is having four events. Find out vector timestamp of each event.
 (c) Find out one cut in the space time diagram, so that the cut is the strongly consistent.

4 + 4 + 4 = 12

5. (a) How is Suzuki-Kasami's broadcast algorithm different from Ricart - Agrawala's algorithm (in terms of message complexity and synchronization delay)?
- (b) Prove $|R_i| = \sqrt{N}$ in Maekawa's algorithm.
- (c) Prove that Maekawa's algorithm satisfies mutual exclusion. How many message transfers is required per CS execution in this algorithm?

$$4 + 4 + 4 = 12$$

Group - D

6. (a) Explain Obermarck's path-pushing algorithm.
- (b) What is the drawback of the above algorithm?
How many message transfer is required to detect the deadlock in Obermarck's algorithm (assume number of sites = n)?
- (c) What is the use of resource status table and process status table in Ho-Ramamootrthy One-Phase algorithm? How is detection of false deadlock avoided in the said algorithm?

$$5 + 4 + 3 = 12$$

7. (a) Explain the access matrix model of protection in distributed system briefly.
- (b) Write an edge chasing deadlock detection algorithm.

$$6 + 6 = 12$$

Group - E

8. Explain any three architecture:
- i) Crossbar switch architectures
 - ii) Multistage architectures
 - iii) Hypercube architectures
 - iv) NUMA architecture

$$4 \times 3 = 12$$

- 9.(a) Define distributed file system (DFS)? What are the different requirements of the distributed file system?
- (b) Explain reference model of Real Time System.

$$6 + 6 = 12$$