

END SEMESTER EXAMINATION, JUNE - 2019
MCA FOURTH SEMESTER

COURSE CODE: MCA207**COURSE TITLE: DISTRIBUTED COMPUTING****[Time allotted: Three hours]****[Max. Marks: 100]***Note: Attempt all Sections & Questions.*

Section (A)

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. Define Pastrepeats method for load estimation.
- b. What are the implementations rules for logical clock?
- c. List the advantages and disadvantages of distributed system.
- d. Illustrate the concept of concurrency.
- e. What are the request-reply protocols?
- f. What are the requirements of DFS?
- g. Draw the state transition diagram of the load of a node in case of double-threshold policy.
- h. Define URL, URI and URN.
- i. In one-to-many communication, how the degree of reliability is expressed?
- j. What are the sub activities involved in process migration?

Section (B)

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Discuss in detail about group communication.
- b. With the help of suitable example, show the implementation of lamport's logical clocks.
- c. Describe the WFG based distributed deadlock detection algorithm.
- d. What is RPC? How it is implemented. Explain in detail with suitable diagram.
- e. What are the motivations for replication in distributed systems?
- f. A process with transaction timestamp 70 needs a resource held by a process with transaction timestamp 200. What happened in:
 - i. Wait-die?
 - ii. Wait-wound?
- g. Contribute your comments on granularity and page replacement issues in the design of distributed shared memory systems.

Section (C)

Attempt any 3 questions.**(15 x 3 = 45)**

- Q. 3. a.** Consider a distributed environment with four systems, A, B, C, and D. Name the type of transparencies required in each of the following situations. Give reasons for your answer. **(8)**
- i. Data available at all four systems and user wants to modify the data at D.
 - ii. Printer connected to A is disconnected and connected to B. User wants to access that printer.
 - iii. Breakdown of system D.
 - iv. User wants to access the software X without knowing its whereabouts.
- b.** Consider a bank database which is fully replicated. Give an algorithm/protocol for ordering of transactions in this situation. **(7)**
- Q. 4. a.** Describe the working of CBCAST protocol with suitable example. **(7.5)**
- b.** Explain the use of primary copy and quorum based protocols in multicopy update problem? **(7.5)**

- Q. 5. a.** Explain how 2PC protocol for nested transactions ensures that if the top level transaction commit then all the right descendents are committed or aborted. (7.5)
- b.** Why are election algorithms normally needed in a distributed system? A LAN-based distributed system has broadcast facility. Suggest a simple election algorithm for use in this system. (7.5)
- Q. 6. a.** What is caching? How it is useful in DFS? (7)
- b.** Suppose you have to design a load balancing algorithm for a distributed system. Which of the selfish, altruistic, and intermediate priority assignment policies will you use in your algorithm if the distributed system is based on the following models: (8)
- i.** Workstation-server model
 - ii.** Processor-pool model
- Give reasons for your answer.
- Q. 7. a.** Describe various approaches for mutual exclusion and do a comparison on the basis of message per entry/exit, delay before entry, and problems associated. (8)
- b.** A system consists of three processors p_1 , p_2 , and p_3 , and a process having four tasks t_1 , t_2 , t_3 , and t_4 is to be executed on this system. Suppose E_{ij} is the cost of executing task t_i on processor p_j , C_{ij} is the communication cost between tasks t_i and t_j when the two tasks are assigned to different processors. Let $E_{11}=31$, $E_{12}=4$, $E_{13}=14$, $E_{21}=1$, $E_{22}=5$, $E_{23}=6$, $E_{31}=2$, $E_{32}=4$, $E_{33}=24$, $E_{41}=3$, $E_{42}=28$, $E_{43}=10$, $C_{12}=35$, $C_{13}=3$, $C_{14}=8$, $C_{23}=6$, $C_{24}=4$, and $C_{34}=23$. Find an optimal assignment of the tasks to the processors and calculate the cost of optimal assignment. Now compare this cost with the assignment cost of the case in which t_1 and t_2 are assigned to p_1 , t_3 is assigned to p_2 , and t_4 is assigned to p_3 . (7)
