MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: DISTRIBUTED SYSTEMS [ICT3201]

REVISED CREDIT SYSTEM
(18 /04/2018)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:

❖ Answer ALL questions.

❖ Missing data may be suitably assumed.

1A.	Explain the transparency, scalability and openness distributed system design challenge. Also, explain suitable solutions to design a network transparent, scalable and open distributed system.	5
1B.	Explain with suitable examples flat and nested distributed transaction.	3
1C.	What are the three components of security? Explain	2
2A.	What do you mean by name resolution? Explain with suitable examples/diagram the types techniques used for name resolution in Domain Naming service(DNS).	5
2B.	Write the vector clock implementation conditions. Consider the event diagram given in the Fig.Q.2B for processes P1, P2 and P3 executing in a distributed system. Compute the vector that is piggybacked on each message.	3
2C.	Consider two communication services for use in asynchronous distributed systems. In service A, messages may be lost, duplicated or delayed and checksums apply only to headers. In service B, messages may be lost. delayed or delivered too fast for the recipient to handle them, but those that are delivered arrive order and with the correct contents. Describe the classes of failure exhibited by each service. Classify their failures according to their effect on the properties of validity and integrity. Can service B be described as a reliable communication service?	2
3A.	Explain with suitable illustration one data centric and one client centric consistency model.	5

3B.	Explain the use of the following with suitable illustrations.
	  i. Remote Object Reference
	  ii. rmi registry
	  iii. URI and URL
		3

3C.	Classify the following events based on types of failure:
	  i. Sudden shut down of system
	  ii. Network crash
	  iii. System reset while working
	  iv. Unnoticed event handler closing a word document
		2

4A. Explain the main functional components of a distributed object model with suitable diagram? Write a simple client server application for accessing the welcome message service provided by a remote Welcome class object hosted on a server with an IP address ***.**.**.** . Use java rmi. 5

4B. With suitable illustration explain any one decentralized algorithm for mutual exclusion. Also, compare the decentralized algorithm with centralized algorithm in terms of number of messages. 3

4C. An email exchange server needs to send 200 mails to users every 5 minutes. The mail server uses TCP protocol for establishing connection and POP3 protocol for listing the mails from exchange server. Discuss:
  i. The possible conditions for mails to be lost or received with additional delay, if available bandwidth in exchange server is only 120Mbps while the required bandwidth is 150Mbps.
  ii. The possible conditions for mails to be lost or received with additional delay, if available bandwidth in exchange server is only 120Mbps while the required bandwidth is 50Mbps. 2

5A. Explain with suitable diagram/illustration how the following distributed file system requirements are met by the SUN NFS . 5
  i. Transparency ii. Fault Tolerance iii. Security iv. scalability

5B. What is external data representation and marshalling? Write a JAVA class that can be serialized and a CORBA CDR equivalent to the structure "Student" given below:

```
struct Student {
string name;
unsigned long regno;
unsigned long marks ;
};
```
  3

5C. A distributed system may have multiple, independent resources. Imagine that a process 0 wants to access resource A and process 1 wants to access resource B. Can Ricart Agrawala's algorithm lead to deadlock? Explain your answer. 2
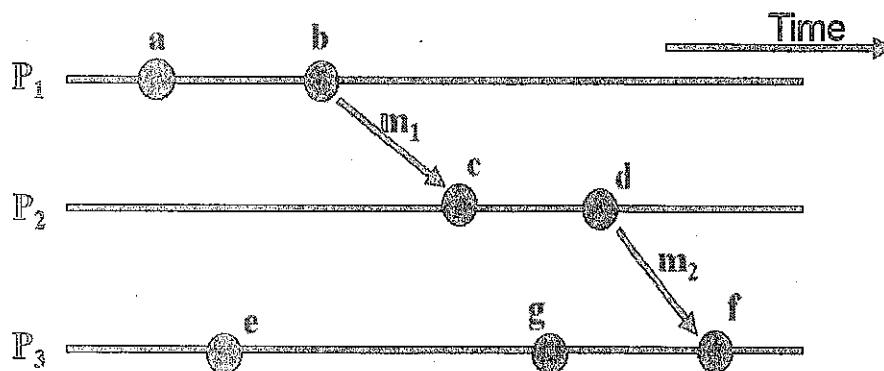

Fig. Q.2B