Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

MAKEUP EXAMINATIONS, JUNE 2017

SUBJECT: DISTRIBUTED SYSTEMS [ICT 3201]

REVISED CREDIT SYSTEM
(13/06/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data, if any, may be suitably assumed.

1A. Differentiate between the message passing model and RPC model of communication. Explain RPC mechanism with a neat block diagram. 5

1B. Explain three approaches to external data representation (XDR) with an example. 3

1C. Differentiate between asynchronous and synchronous distributed systems. 2

2A. Explain the roles of domain name server, DNS queries, navigation, binder and a resolver in implementing Domain Name System. 5

2B. Explain with suitable examples delivery guarantees with may be, at least once and at most once semantics. Also explain the semantics mostly used in JAVA RMI. 3

2C. Consider a web browser that returns an outdated cached page instead of a more recent one that had been updated at the server. Is this a failure, and if so, what kind of failure? Explain. 2

3A. Identify and explain any five challenges involved in designing e-mail service. 5

3B. Differentiate between the following:

i) Clock skew and clock drift.
ii) External synchronization and Internal synchronization. 3

3C. A client makes remote procedure calls to a server. The client takes 5 milliseconds to compute the arguments for each request, and the server takes 10 milliseconds to process each request. The local operating system processing time for each send or receive operation is 0.5 milliseconds, and the network time to transmit each request or reply message is 3 milliseconds. Marshalling or un-marshalling takes 0.5 milliseconds per message. Calculate the time taken by the client to generate and return from two requests. 2

4A. Differentiate between Lamport and Vector timestamp. Consider the event diagram given in Fig.Q.4A for processes P1, P2 and P3 executing in a distributed system. Compute the vector and Lamport timestamp for each event.

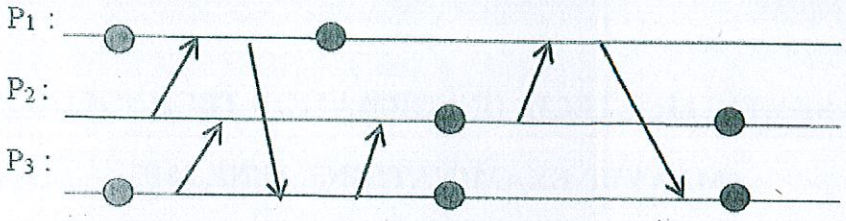

Fig.Q.4A 5

4B. For the given replica's as shown in Fig.Q.4B, calculate the following as a Conit measure: (Assume initially x=0 and y=0)

i) Vector clock at A & B
ii) Order Deviation at A & B
iii) Numeric deviation at A & B

Replica A Conit : x=3;y=8		Replica B Conit : x=2;y=8	
Operation	Result	Operation	Result
<4,A> x=x+2	x=2	<4,A> x=x+2	x=2
<7,B> y=y+3	y=3	<7,B> y=y+3	y=3
<9,B> y=y+1	y=4	<9,B> y=y+1	y=4
<12,A> y=y+4	y=8	<12,A> y=y+4	y=8
<17,A> x=x+1	x=3		

Fig.Q.4B 3

4C. What is the drawback of Cristian's method for synchronizing clocks? How this drawback is solved using Berkeley algorithm? 2

5A. Mention 2 primary based protocols; explain each protocol with an example. 5

5B. Differentiate between consistent, inconsistent and strongly consistent cut. Identify consistent, inconsistent and strongly consistent cuts in the given Fig.5B.

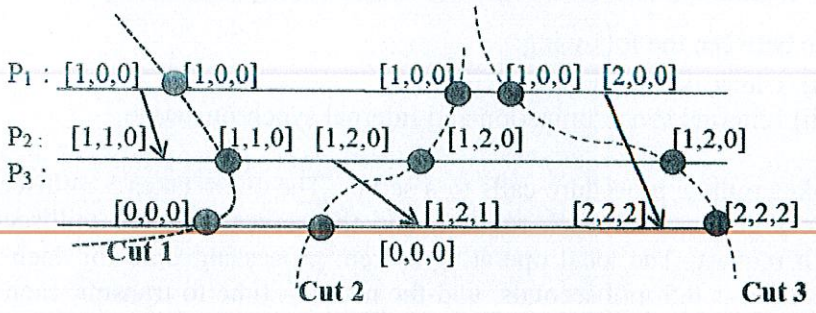

Fig. 5B 3

5C. Calculate accuracy if round trip time is 20ms and minimum latency between two processes P_1 and P_2 is 5ms. Calculate internal synchronization bound between process P_1 and P_2, if the external synchronization bound between P_1 and P_2 is 'B'. 2