Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, APR/MAY 2017

SUBJECT: DISTRIBUTED SYSTEMS [ICT 3201]

REVISED CREDIT SYSTEM
(20/04/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Explain Remote Method Invocation (RMI) in client-server architecture. Differentiate between RMI and RPC. 5

1B. Consider the web as a distributed system. Discuss the various design issues to be considered when
i) link www.google.com is lost
ii) link www.w3schools.com is accessed by multiple users.
iii) new web link www.netlabs.com is to be added and managed 3

1C. Bring out the difference between a local call and a remote call. 2

2A. Explain Global Name Service (GNS). Write a directory-value tree representation of a student "XYZ" who is studying in Computer Engineering department of any institution "ABC". 5

2B. Choose connectionless (UDP) and connection-oriented (TCP) communication for the implementation of each of the following application level or presentation level protocols and justify
i) virtual terminal access (for example, Telnet)
ii) file transfer (for example, FTP)
iii) remote procedure call 3

2C. Write namespace representation in XML for a teacher structure given below. 2

```
struct Teacher{
        string name;
        unsigned long year_of_join;
        string experience;
        string designation;
};
```

3A. Identify and describe any five transparencies present in web service. 5

3B. For the given replica's as shown in Fig.Q.3B, calculate the following as a Conit measure: (Assume initially x=0 and y=0) 3

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

Replica A		Replica B	
Conit: x=5, y=7		Conit: x=3, y=5	
Operation	Result	Operation	
<4,B>x=x+3	x=3	Result	
<5,A>x=x+2	x=5	<4,B>x=x+3	x=3
<7,B>y=y+4	y=4	<7,B>y=y+4	y=4
<12,A>y=y+1	y=5	<12,A>y=y+1	y=5
<16,A>y=y+2	y=7		

Fig.Q.3B

3C. What is the effect of message size and timeouts on the datagram communication? Explain. 2

4A. For the given sequential processes P1, P2 and P3, calculate X', Y'& Z' values for the following execution sequence: 5

i) 1-2-3-7-8-4-5-6-9, Is the execution sequence consistent? Justify.
ii) 1-4-5-6-7-8-9-2-3, Is the execution sequence consistent? Justify.

Sequential concurrent processes: P1, P2 and P3
Shared variables: X, Y & Z (initially X=0, Y=8, Z=12)

P1	P2
1. Store 4,(X) (X=4) 2. Load R1,(X) 3. Store R1,(X')(X'=X+Y)	4. Load R2,(Y) 5. Store R2, (Y')(Y'=Y+X) 6. Store 20,(Z) (Z=20)
P3	
7. Load R3 (Z) 8. Store R3,(Z'=Z+4) 9. Store 22,(Y)(Y=22)	

4B. Write the vector clock implementation conditions. Consider the event diagram given in Fig.Q.4B for processes P1, P2 and P3 executing in a distributed system. Compute the vector that is piggybacked on each message.

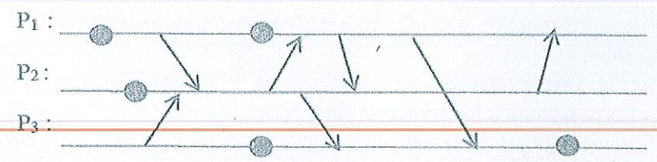

Fig.Q.4B 3

4C. Define synchronization delay. Calculate the maximum throughput and response time for a process with synchronization delay of 30ms and it spends a minimum of 5ms in critical section. 2

5A. Mention and illustrate three different types of replicas in content replication and placement. 5

5B. Is the event sequence in Fig.Q.5B(i) & (ii), a causally-consistent store or sequentially consistent store or both? Justify.

P1 : W(X)a W(X)c
P2 : R(X)a W(X)b W(X)d
P3 : R(X)a R(X)b R(X)c
P4 : R(X)a R(X)b R(X)d

Fig.Q.5B(i)

P1 : W(X)a
P2 : R(X)a W(X)b W(X)c
P3 : R(X)b R(X)c R(X)a
P4 : R(X)a R(X)b R(X)c

Fig. Q.5B(ii)

5C. Distinguish between five classes of failures that can occur in RPC systems. 3 2