UNIVERSITY OF RUHUNA
BACHELOR OF COMPUTER SCIENCE (BCS) (GENERAL) DEGREE LEVEL III
(SEMESTER I)
EXAMINATION – JULY 2016

COURSE UNIT : CSC3172 - Distributed Systems **TIME: 2 Hours**

Answer all four Questions.

1.

a. Describe three characteristics of distributed systems.

b. List three key properties of distributed systems and explain each of them considering *World Wide Web* as an example.

c. One of the important features of distributed systems is its 'openness'. Explain what is meant by 'open', giving three services provided by a distributed system.

d. Explain what is meant by the terms access transparency, location transparency and replication transparency.

2.

a. State two advantages and two disadvantages of optimistic concurrency control.

b. How do 'idempotent' operations simplify failure recovery?

c. Explain *Maekawa*'s distributed mutual exclusion algorithm using an example.

d. In a certain system, a process typically uses a critical section many times, by re-entering almost immediately after exit and before another process accesses that critical section. How many messages does the *Ricart* and *Agrawala* algorithm require per access to the critical section, if number of nodes in this distributed system is N?

3.

a. "Computer security and providing fault tolerance are more critical in distributed systems than in centralized systems". Explain whether you agree or disagree with this statement giving reasons.

b. What is an omission fault that may occur in a distributed system? Explain how you detect such a fault.

c. Consider a distributed system consisting of eight processors numbered 0 to 7. Process 7 is the current coordinator but it has crashed. Process 4 notices the crash of the coordinator and it initiates a new election using ***Bully*** algorithm. Describe the algorithm to elect a new coordinator showing the messages transferred between the processes.

d. Suppose a client synchronizes its clock using *Christian's* algorithm. It sends requests to three different servers simultaneously and records the round trip time and timestamp returned by each server as shown in the following table.

Server	Round trip time (ms)	Time
A	60	06:23:25.575
B	45	06:23:25.345
C	200	06:23:25.823

i. What is the server that the client should synchronize with, in order to achieve best accuracy?
ii. What time should it set its software clock to?

4.

a. NFS implements remote access model for file handling. But, it can be argued that it also supports upload/download model. Explain giving reasons.

b. Describe two characteristics of peer-to-peer (P2P) network.

c. What is the role of *gridware* in computational grids?

d. Answer the following questions regarding cloud computing.

i. Explain two advantages and two disadvantages of cloud computing systems.
ii. Describe three characteristics of Software-as-a-Service model.
iii. Compare public cloud vs. private cloud concepts.