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**University Examinations 2015/2016**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR MASTER SCIENCE IN COMPUTER SCIENCE

**CCS 5153: DISTRIBUTED SYSTEMS**

**DATE: NOVEMBER, 2015 TIME: HOURS**

**INSTRUCTIONS: Answer question ONE and any other Three.**

**QUESTION ONE (30 MARKS)**

1. Resources in distributed systems are too large to be managed by a singlewide distributed operating system:
2. Discuss limiting factors that favour the statement above. (6 Marks)
3. Because of the limitations in (i) how are operating systems implemented in distributed systems. (3 Marks)
4. Deadlocks are a familiar problems in distributed systems. State and explain any four conditions that favor occurrence of deadlocks. (4 Marks)

From your stated deadlock conditions, evaluate with reasons whether a deadlock condition could occur in;

1. A local area network. (2 Marks)
2. A standalone PC (2 Marks)
3. Process migration and file replication are two activities associated with distributed systems. What do they entail and how are problems associated with them solved. (7 Marks)
4. Clock skew and drift are deviations within physical clocks in distributed systems.
5. State the cause of the deviations. (2 Marks)
6. How can the deviations be corrected? (2 Marks)
7. Do the same correction methods in (ii) apply for a standalone PC. Give reasons.

(2 Marks)

**QUESTION TWO (10 MARKS)**

1. With aid of diagrams, describe the following distributed system models:- (3 Marks)
2. Work station model
3. Mini compute model

State one advantage and one disadvantage of each model. (3 Marks)

1. Transparency is a consideration in the design of distributed operating systems. Explain any 4-transparency features that could be useful in the design of distributed operating systems.

(4 Marks)

**QUESTION THREE (10 MARKS)**

1. Explain the client/server three message , and four message reliable IPC protocols.(4 Marks)
2. Client server level tasks can be broadly divided into three layers namely; Presentation, Business logic and Services/ Data access.
3. Explain the basic function of each layer. (4 Marks)
4. How would the layers be used to realize an N-tier client/server system? (2 Marks)

**QUESTION FOUR (10 MARKS)**

1. With the help of a well labeled block diagram, explain the process of message passing in Remote procedure call (RPC) (6 Marks)
2. State the features that make Remote method invocation (RMI) different from RPC.

(4 Marks)

**QUESTION FIVE (10 MARKS)**

1. i) What is coordinated universal time (UTC) Give an account of how UTC is used in distributed system to synchronize clocks. (4 Marks)

(ii) Outline the process of Internet Network Time Protocol(NTP) in time coordination in distributed systems. (3 Marks)

1. How are clocks implemented in individual computer systems? (3 Marks)