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**University Examinations 2016/2017**

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF

BACHELOR OF SCIENCE IN COMPUTER SCIENCE, BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY AND BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

**CCS 3427/CCS 3351: DISTRIBUTED SYSTEMS**

**DATE: DECEMBER 2016 TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two***questions.

**QUESTION ONE (30 MARKS)**

1. Differentiate between the following terms (6 marks)
2. Multi-computers and multi-processors
3. Thin and Fat clients
4. SISD and MIMD
5. Briefly discuss the FOUR main design goals of distributed system (8 marks)
6. Redundancy is the key technique to achieving fault tolerance. Discuss the three forms of redundancy. (6 marks)
7. A name space for large-scale distributed systems is often organized hierarchically. Briefly describe the three layers of this organization (6 marks)
8. With the aid of a well labeled diagram, discuss symmetric cryptography. (4 marks)

**QUESTION TWO (20 MARKS)**

1. Fault tolerance implies dependability in distributed systems. Briefly describe what dependability implies in distributed systems (8 marks)
2. What is a consistency model (3 marks)
3. Briefly discuss the three data centric consistency models (9 marks)

**QUESTION THREE (20 MARKS)**

1. Explain the difference between Remote Procedural Calls (RPC) and Remote Method Invocations (RMI) (4 marks)
2. Giving examples, discuss three main types of distributed systems (6 marks)
3. Discuss any four types of communication in distributed systems (8 marks)
4. List any two benefits of building distributed systems (2 marks)

**QUESTION FOUR (20 MARKS)**

1. Briefly discuss the ACID properties of transactions in distributed systems (8 marks)
2. Discuss any three security objectives in computer system (6 marks)
3. With the aid of a diagram, discuss a distributed system as middleware (6 marks)

**QUESTION FIVE (20 MARKS)**

1. With the aid of a well labeled diagrams, discuss four software architectures for distributed systems (12 marks)
2. Discuss any four security threats on data in distributed systems (8 marks)