JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

UNIVERSITY EXAMINATION FOR THE DEGREE OF BSC IN COMPUTER SECURITY AND FORENSIC

2ND YEAR 2ND SEMESTER 2020/2021 ACADEMIC YEAR

SPECIAL/RESIT

MAIN CAMPUS

COURSE CODE: **IIT 3223**

COURSE TITLE: **SYSTEMS PROGRAMMING**

EXAM VENUE: **MAIN CAMPUS**

DATE: **STREAM: BSC FORENSICS**

TIME: 2 HOURS **EXAM SESSION:**

INSTRUCTIONS:

1. **Answer question 1 is Compulsory and any other two questions in Section B**
2. **Candidates are advised not to write on the question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE (30 MARKS)

a) Explain the meaning of distributed operating systems and its benefits (4 marks)

b) Discuss the following Berkeley sockets protocol families: PF_IPX, PF_X25 and PF_PPPOX (6 marks)

c) Explain the meaning of the following internet protocols and how they are used: RIP, DVMRP, IGMP, MARS and PIM-SM (5 marks)

d) Security problems encountered in Internet communications are to some extent similar to those with immobile data. Essentially these problems fall into five generic categories. Explain these categories (5 marks)

e) Explain the concept of Remote Method Invocation as used in distributed systems and outline four conditions required in its implementation. (6 marks)

f) Explain any four types of transparency in distributed systems. (4 marks)

QUESTION TWO (20 MARKS)

a) Berkeley sockets are computing library with an application programming interface for internet sockets and Unix domain sockets, used for inter-process communication. Using example, explain five header files used by Berkeley sockets. (5 marks)

b) Explain the meaning of the following terminologies in relation to computer transactions processing: abort, commit, log and commit protocol. (8 marks)

c) Explain the meaning of distributed operating system and discuss any three general advantages of distributed systems. (7 marks)

QUESTION THREE (20 MARKS)

a) Explain what a fault tolerant system means and discuss the basic characteristics required for fault tolerant systems. (10 marks)

b) The socket() creates an endpoint for communication and returns a file descriptor for the socket. This function takes a number of arguments. Clearly explain those arguments and us a prototype example. (5 marks)

c) An Internet socket is characterized by a unique combination of components. Explain the meaning of a socket and what constitutes internet sockets. (5 marks)

QUESTION FOUR (20 MARKS)

a) With the aid of suitable diagrams, compare and contrast the open systems interconnection (OSI) network model and the TCP/IP model. (8 marks)

b) In developing a network layer application, a server has two steps in order to begin the server and wait for connections. The first is setting up the socket to listen on a specific port, and the second is to actively wait for incoming connections. Functions bind () and listen () are used to begin the server. The bind command attaches the socket to a port, and the listen command tells the interface to prepare to queue incoming connection requests. Write program segments that would perform these tasks. (12 marks)

QUESTION FIVE (20 MARKS)

a) Discuss the concept of remote procedure call in distributed systems and explain the weaknesses in its implementation. (5 marks)

b) In the design and implementation of distributed systems, the following key issues must be considered: Transparency, flexibility, reliability, performance and scalability. Exhaustively discuss these issues. (10 marks)

c) The accept() function creates a new socket for each connection and removes the connection from the listen queue. Discuss its arguments and give function prototype. (5 marks)