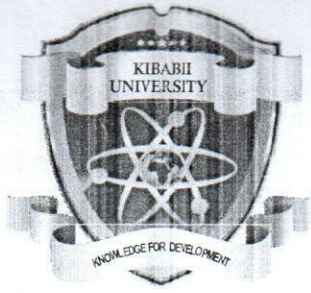


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KIBABII UNIVERSITY
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UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
YEAR THREE SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

COURSE CODE : CSC 371E
COURSE TITLE : REAL TIME SYSTEMS

DATE: 21/07/2021 TIME: 9.00 A.M – 11.00 A.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE [COMPULSORY] [30 MARKS]

- a) Describe the following terms. **[4 Marks]**
- i. Real-time Systems
 - ii. Hard real-time systems
- b) Discuss areas in which real-time systems are applied. **[6 Marks]**
- c) Using a well labeled diagram, describe model of a typical real-time system. **[8 Marks]**
- d) Elucidate characteristics of Real-Time Systems. **[6 Marks]**
- e) What is the relationship between safety and reliability in Real-Time Systems? **[2 Marks]**
- f) Reliability is a key requirement for Real-Time Systems; discuss how this can be achieved. **[4 Marks]**

QUESTION TWO [20 MARKS]

- a) Differentiate between Real-Time Tasks. **[4 Marks]**
- i. Hard RTT and Firm RTT
 - ii. Soft RTT & Non RTT
- b) Based on time, events in real-time systems can be classified in two main categories. Discuss these categories. **[4 Marks]**
- c) Using examples, describe the following time constraints. **[6 Marks]**
- i. Performance Constraint
 - ii. Behavioural Constraint
 - iii. Performance Delay Constraint
- d) Using a well labeled diagram, describe classifications of timing constraints. **[6 Marks]**

QUESTION THREE [20 MARKS]

- a) Differentiate the following terms as used in Real-Time Task Scheduling [4 Marks]
- i. Relative deadline and Absolute deadline
 - ii. Task Instance and Task Precedence
- b) Discuss classifications of Real-Time Tasks. [6 Marks]
- c) Discuss the following categories of RTT scheduling algorithms. [6 Marks]
- i. Clock Driven
 - ii. Event Driven
 - iii. Hybrid
- d) Describe relationship between Table Driven Scheduling and Cyclic Scheduler. [4 Marks]

QUESTION FOUR [20 MARKS]

- a) Define the following terms [4 Marks]
- i. Serially reusable resource
 - ii. Non pre-emptable resource
- b) Explain how priority inheritance protocol works. [6 Marks]
- c) Discuss how the following problems of PIP can be resolved. [6 Marks]
- i. Deadlock
 - ii. Chain Blocking
- d) Describe the functioning of Priority Ceiling Protocol (PCP). [4 Marks]

QUESTION FIVE [20 MARKS]

- a) Define the following terms as used in RTS. [2 Marks]
- i. Clock Synchronization
 - ii. Real-Time Operating System (RTOS)
- b) Describe the role of clock in RTS. [4 Marks]
- c) Using well labeled diagram, discuss two approaches of clock synchronization in RTS. [8 Marks]
- d) Giving examples, explain key features of Real-Time Operating Systems. [6 Marks]