(35)

(Knowledge for Development)

KIBABII UNIVERSITY

(KIBU)

UNIVERSITY EXAMINATIONS
2021/2022 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: 19/05/2022 TIME: 09.00 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

   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]**