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**University Examinations 2015/2016**

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

**CCE 5103: REAL TIME SYSTEMS DESIGN AND DEVELOPMENT**

**DATE: NOVEMBER, 2015 TIME:** $3$ **HOURS**

**INSTRUCTIONS: Answer question ONE and any other Two**

**QUESTION ONE (30 MARKS)**

1. Distinguish between hard real time systems and soft real time systems. Give examples of software categories that might fall under each of these types. (5 Marks)
2. With the help of a clear diagram, describe the sensor and actuator processes. (5 Marks)
3. Distinguish between preemptive and non-preemptive scheduling. Support your answer with suitable examples. (5 Marks)
4. Explain any two features that might be associated with real time operating systems.

(5 Marks)

e) Java 2.0 supports concurrent programming through the concept of multithreaded programming. Despite this feature, Java 2.0 is still considered unsuitable for real time system development. Why do you think this is so? (4 Marks)

f) Some real time systems have been categorized as monitoring systems and others as control systems. In addition, there is a third hybrid category known as monitoring and control systems. Give an example for each of these three categories and then explain how they work. (6 Marks)

**QUESTION TWO (15 MARKS)**

1. Distinguish between clock driven and priority driven scheduling. (4 Marks)
2. Give an advantage and a disadvantage in each case of scheduling. (4 Marks)
3. Five jobs A,B,C,D and E that are in the ready queue waiting for processor allocation have execution times of 7,8,14,9 and 5 seconds respectively. The scheduling algorithm to be used is the round robin algorithm, where a time slice of 4 seconds is allocated for each round.
4. Explain the basic principles of round robin scheduling algorithm. (3 Marks)
5. Explain how the scheduler will tackle these jobs. (4 Marks)

**QUESTION THREE (15 MARKS)**

1. It has been argued that it is possible and indeed very viable to have the internet support real time communication. Explain how the internet would be extended to make this possible.

(9 Marks)

1. What in your opinion makes Linux and Windows operating systems unsuitable for supporting real time systems? (6 Marks)

**QUESTION FOUR (15 MARKS)**

1. What is priority inversion and what solutions would you recommend to the problem of priority inversion? (7 Marks)
2. It has been argued that some resources are non-preemptable. Do you agree with this argument? Discuss. (8 Marks)

**QUESTION FIVE (15 MARKS)**

1. A real time system is needed that will control traffic for a four-road junction that also has a roundabout. Explain some of the possible challenges that will arise as motorists try to enter the roundabout. (9 Marks)
2. Linux for Real Time Applications has improved features to handle real time systems as opposed to the traditional Linux. Explain how it handles scheduling. (6 Marks)