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## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Second Semester, M. Tech – VLSI Design and Embedded System (MECE)

Semester End Examination; June - 2016

Real Time Operating System

Time: 3 hrs

Max. Marks: 100

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

### UNIT - I

- |   |    |
|---|----|
| 1 a. Compare soft and hard real time service utilities.   | 8  |
| b. Write any six key features that an RTOS should have.   | 6  |
| c. Differentiate between pre-emptive and non pre-emptive scheduling.  | 6  |
| 2 a. Write the state transition diagram and state transition table for a thread of execution including all possible states. | 10 |
| b. Explain briefly the history of embedded systems and write the pseudo code for basic real time service.                   | 10 |

### UNIT - II

- |  |    |
|--|----|
| 3 a. Explain RM-LUB sufficient feasibility test by taking the example of two services. | 10 |
| b. Describe the algorithms for discrimination of N and S feasibility.                  | 10 |
| 4 a. Explain the following :   | 10 |
| i) Shared memory          ii) ECC memory.  |    |
| b. Explain execution efficiency and pipelining.  | 10 |

### UNIT - III

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|--|----|
| 5 a. Define priority inversion. Mention the three conditions that cause unbounded priority inversion. Explain the solution for unbounded priority inversion. | 10 |
| b. Describe dead lock and critical section with shared memory as resources and the use of semaphores as a solution to this problem.                          | 10 |
| 6 a. Explain the ways of handling missed deadlines and quality of service (QOS) for a real time system.  | 10 |
| b. Explain briefly the mixed hard and soft real time services.   | 10 |

### UNIT - IV

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|--|----|
| 7 a. Describe the three firmware components and any three RTOS system software mechanisms. | 12 |
| b. Explain message queue and heap based message queue for inter task communication.        | 8  |
| 8 a. What are exceptions assert and single step debugging? How are they used?              | 8  |
| b. What is application level debugging?  | 4  |
| c. Explain the power-on self test and memory testing.                                      | 8  |

**UNIT - V**

- 9 a. Explain method to find path length, efficiency and calling frequency using C code to compute Fibonacci sequence. 10
- b. Explain basic concepts of drill down tuning. 10
- 10 a. Compare reliability and availability; also discuss reliability with an example. 10
- b. Explain multi tasking application by considering the example of digital clock and thermometer that runs a PIC microcontrollers. 10

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