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

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, M. Tech - VLSI Design and Embedded System (MECE)
Semester End Examination; Jan. - 2020
Advanced Embedded System

Time: 3 hrs　　　　　　　　　　　　　　　　　　　　　　　　　　*Max. Marks: 100*

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

UNIT - I

1 a. List the typical components of an embedded system and explain the same in connection with a Patient Monitoring system.　　10

  b. Discuss I^2C and SPI bus as On-board communication interface and USB as external communication interface.　　10

2 a. Discuss the operational quality attributes for its importance.　　10

  b. Discuss a typical embedded system used in automotive for fuel injection emphasizing on important components of a typical embedded system.　　10

UNIT - II

3 a. Develop a FSM model for automatic tea / coffee / milk vending machine, which will wait for Rs.10 coin insertion and dispense tea / coffee / milk as output action. Include option of your need.　　10

  b. Discuss process of;

   i) Creating part numbers

   ii) Design rules check

   iii) Creating bill of materials in a EDA tools　　10

4 a. Discuss the assembly language to machine language conversion process with a suitable diagram and also discuss advantage of assembly language based development of embed system.　　10

  b. Explain concurrent / communicating process model taking seat belt warning system in automotive as example.　　10

UNIT - III

5 a. Three processes with process ID's P_1, P_2, P_3 with estimated completion time 6, 4, 2 milliseconds respectively enters the ready queue together in the order P_1, P_2, P_3. Calculate the waiting time and turnaround time for each process and the average waiting time and turnaround time (Assuming there is no I/O waiting for the processes) in RR algorithm with time slice.　　10

  b. Describe "Deadlock" situation and discuss condition favoring and different means of handling "Deadlock".　　10

6 a. Discuss the functional and non-functional requirements in choosing the RTO's. 10

b. Three processes with process ID's P_1, P_2, P_3 with estimated completion time 10, 5, 7 milliseconds respectively enters the ready queue together. A new process P_4 with estimated completion time 2 milliseconds enters the "Ready" queue after 2 milliseconds. Assume all the processes contain only CPU operation and no input/output operation are involved. Calculate the waiting time and turnaround time for each process and the average waiting time and turnaround time in preemptive short text job first algorithm. 10

UNIT - IV

7 a. Discuss the following data type used in embedded C:

i) Signed short int ii) Unsigned char iii) Unsigned int 10

iv) Float v) Long double

b. Write a small embedded C program to test the status of bit 5 of the status register and reset it. If is 1, of a device, which is memory mapped to the CPU. The status register of the device is memory mapped at location 0×7000. The data bus of the controller and the status register of the device is 8 bit wide. The application should illustrate the usage of bit manipulation operations. 10

8 a. Discuss Recursion, Iteration and Reentrant functions and discuss their merits and demerits. 10

b. Write a small embedded C program to complement bit 5 (assume bit numbering starts at 0) of the status register of a device which is memory mapped to the CPU. The status register of the device is memory mapped at location 0×3000. The data bus of the controller and the status register of the device is 8 bit wide. 10

UNIT - V

9 a. Using Keil µ vision 3 IDE as illustrating tool explain:

i) Firmware debugging operations 10

ii) Target flash memory programming configuration

b. Discuss about:

i) System on chip

ii) Multi-core processors 10

iii) Re-configurable processors

10 a. Discuss following target hardware debugging techniques:

i) Magnifying glass

ii) Digital CRO 10

iii) Logic analyzer

iv) Boundary scan

b. List types of files generated on cross compilation and discuss any three of them. 10

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