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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: VII**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 19EC7PCESD **Max Marks: 100**
Course: Embedded System Design **Date: 22.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Compare General purpose computing system and Embedded System. List some of the operational and non-operational quality attributes of an embedded system. **10**

b) An embedded system design needs an 8KX8 RAM module. Design an 8KX8 RAM module using 2KX8 RAM chips. The module should be connected on an 8-bit processor with a 16-bit address bus, and occupy the address range starting from the address A000. Show the circuit and the memory map. **10**

UNIT - II

2 a) Discuss and compare the following serial communication protocols: **10**

i) I2C ii) SPI

b) Discuss Priority based arbitration vs Daisy chain arbitration when multiple peripherals request service from a single resource. **10**

OR

3 a) Illustrate the workflow of a DMA controller when an input device sends a DMA request. Why is DMA preferred for bulk data transfer? **10**

b) Discuss the serial communication when a master device has to send data to a slave device on the I2C bus. Draw the timing diagram. Compare I2C and SPI protocol. **10**

UNIT - III

4 a) With examples, discuss and analyse the Super-loop and Embedded OS based firmware design approaches. **08**

b) Write an embedded C/C++ program to interface a common cathode 7-sement display at GPIO port-0 of LPC 1768 controller. Assume the port pins for data lines and enable of the display as:
Port0-pin0- pin7 : D0-D7 respectively.
Port0-pin8- enable line of display. **12**

OR

5	a)	Write an embedded C/C++ program to interface a buzzer to LPC 1768 controller using a relay connected to port 0 pins.	**10**
	b)	Discuss the high level language to Machine level language conversion process with neat illustrations.	**10**

UNIT - IV

6	a)	Three processes with process IDs P1, P2, P3 with estimated completion time 10, 5, 7 milliseconds and priorities 0, 3, 2 (0- highest priority, 3 lowest priority) respectively enters the ready queue together. Calculate the waiting time and Turn Around Time (TAT) for each process and the Average waiting time and Turn Around Time (Assuming there is no I/O waiting for the processes) for the Non-preemptive priority based scheduling algorithm.	**10**
	b)	Discuss the Process States & State Transitions with neat illustrations.	**10**

UNIT - V

7	a)	Compare Simulator and Emulator based debugging. What is on chip firmware debugging?	**10**
	b)	Discuss the various details held by the List file and Map file generated during the cross compilation of an embedded C code. Differentiate between Assembler and Disassembler.	**10**

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