U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2024 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: Medical Electronics Engineering **Duration: 3 hrs.**
Course Code: 22MD5PCESD **Max Marks: 100**
Course: Embedded System Design

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	CO	PO	Marks
1	a)	Design and explain the working of a hardware circuit for an embedded system to prevent the microntroller from unexpected program execution behavior when the supply voltage falls below a specified voltage. Exemplify this concept for any processor/microcontroller.	CO1	PO1	**06**
	b)	Discuss the data transmission mechanism using serial half duplex mode with 2 wires, if EEPROM, ADC and RTC are required to be interfaced with a microcontroller. What are its disadvantages?	CO1	PO1	**08**
	c)	Discuss the different types of embedded systems classified on the basis of purpose of their usage. Briefly explain any two.	CO1	--	**06**
		OR			
2	a)	Discourse how power up reset is different from watchdog timer reset.	CO1	PO1	**07**
	b)	Describe the role of actuator in embedded system design with suitable example	CO1	PO1	**05**
	c)	Discuss the role of Cache memory in embedded systems? How it is different from dynamic memory?	CO1	PO1	**08**
		UNIT - II			
3	a)	Discuss any three operational quality attributes of an embedded system and exemplify their significance for medical embedded systems.	CO1	-	**07**
	b)	Develop and explain the concurrent processing model for a Seat Belt Warning System for the following criteria i. When the ignition is turned on and the seat belt is not fastened within 10 seconds of ignition ON, the system generates an alarm signal for 5 seconds	CO1	PO2	**07**

<table>
<tr><td></td><td></td><td></td><td>ii. The Alarm is turned off when the alarm time expires after 5 seconds or if the driver fastens the belt or if the ignition switch is turned off, whichever happens first.</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>c)</td><td>If the source code is written in embedded C, how is ROM image obtained in an embedded system design? Discus.</td><td>CO2</td><td>-</td><td>06</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - III</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>a)</td><td>Differentiate between Emulator and simulator.</td><td>CO1</td><td>-</td><td>08</td></tr>
<tr><td></td><td>b)</td><td>Discuss the various files generated during cross compilation.</td><td>CO1</td><td>-</td><td>07</td></tr>
<tr><td></td><td>c)</td><td>How In System programming is different from out of circuit programming?</td><td>CO1</td><td>-</td><td>05</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - IV</td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>a)</td><td>Differentiate between the properties of Process and Thread in the context of RTOS based embedded system.</td><td>CO3</td><td>-</td><td>07</td></tr>
<tr><td></td><td>b)</td><td>Assume the following data for the processes scheduled using priority based preemptive scheduling algorithm. Lower the number higher is the priority. Sketch Gantt chart for the process execution. Calculate completion time, turnaround time and waiting time for each process. Also calculate throughput of the scheduling.
<table>
<tr><th>Process</th><th>Arrival time</th><th>Burst Time</th><th>Priority</th></tr>
<tr><td>P1</td><td>0</td><td>14</td><td>3</td></tr>
<tr><td>P2</td><td>2</td><td>7</td><td>2</td></tr>
<tr><td>P3</td><td>4</td><td>12</td><td>1</td></tr>
<tr><td>P4</td><td>6</td><td>4</td><td>5</td></tr>
<tr><td>P5</td><td>8</td><td>16</td><td>4</td></tr>
</table></td><td>CO3</td><td>PO2</td><td>08</td></tr>
<tr><td></td><td>c)</td><td>Discuss the various queues maintained by real time OS in association with CPU scheduling?</td><td>CO3</td><td>-</td><td>05</td></tr>
<tr><td></td><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>6</td><td>a)</td><td>What is critical section? Discuss the different techniques for controlling access to critical section?</td><td>CO3</td><td>-</td><td>07</td></tr>
<tr><td></td><td>b)</td><td>Discuss how Microkernel is different from Monolithic Kernel. Which one is widely used in real-time operating systems, and reason why?</td><td>CO3</td><td>-</td><td>06</td></tr>
<tr><td></td><td>c)</td><td>Assume you have the following jobs to execute with one processor, with the jobs arriving in the order listed here. Suppose a system uses RR scheduling with a quantum of 15. Create a Gantt chart illustrating the execution of these processes. What is the turnaround time for each process? What is the wait time for each process? Also calculate the average waiting time and average turnaround time.</td><td>CO3</td><td>PO2</td><td>07</td></tr>
</table>

			<table><tr><th>process ID</th><th>Arrival Time</th><th>Burst Time</th></tr><tr><td>0</td><td>0</td><td>80</td></tr><tr><td>1</td><td>10</td><td>20</td></tr><tr><td>2</td><td>10</td><td>10</td></tr><tr><td>3</td><td>80</td><td>20</td></tr><tr><td>4</td><td>85</td><td>50</td></tr></table>			
			UNIT - V			
	7	a)	With necessary sketches, describe hardware and software requirements for an Automated chocolate vending machine	*CO4*	*PO2*	**10**
		b)	With a neat sketch discuss the software architecture and synchronization model of tasks for a Digital Camera Card.	*CO4*	*PO2*	**10**

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