Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS
II SEMESTER M.TECH. (INDUSTRIAL AUTOMATION & ROBOTICS)
END SEMESTER EXAMINATIONS, MAY 2024
SUBJECT: EMBEDDED SYSTEMS FOR AUTOMATION [MTE 5214]
Date: 30 April 2024

Time: 3 Hours **MAX. MARKS: 50**

Instructions to Candidates:
- Answer **ALL** the questions.
- Missing data can be assumed and suitably justified.

Q. No	Question	M	CO	PO	LO	BL
1A.	Justify the importance of RISC processors over CISC processors in an Embedded Systems.	**4**	**1**	**3**	**2**	**3**
1B.	Analyse a real-life example on the bonding of embedded technology with human life.	**3**	**1**	**1,2**	**1,2**	**3**
1C.	Develop an assembly language program to calculate the factorial of 7 for MSP432P401R and save the result into the memory location 0x20000000.	**3**	**1**	**5**	**2**	**4**
2A.	Explain the programming technology that is used to control the programmable switches in an FPGA with suitable diagrams.	**5**	**3**	**3**	**1**	**2**
2B.	As an Embedded Engineer, justify the utility of FPGA over CPLD in the embedded market and explain the FPGA architecture with necessary diagrams.	**3**	**3**	**3**	**1**	**3**
2C.	Explain the domains and areas of applications of embedded systems.	**2**	**5**	**3**	**5**	**3**
3A.	Explain PCB in the Hardware Design context? and explain the design process of fabricating a PCB.	**4**	**4**	**3**	**1**	**2**
3B.	As a manufacturing engineer explain the role of 'Flexible PCB'? in Embedded Systems? And Explain the general guidelines for an efficient PCB layout.	**4**	**4**	**3**	**1**	**2**
3C.	As a design engineer, you are requested to execute an application that toggles an LED after task execution. Write an embedded C program to toggle a RED LED using MSP432P401R.	**2**	**2**	**5**	**5**	**3**
4A.	Discuss the evolution of programmable devices with suitable diagrams.	**5**	**3**	**3**	**5**	**2**
4B.	In the requirement engineering process, different groups of people such as users, application experts, customers, project managers, hardware and software engineers are involved, justify how to choose an RTOS, and Classify the types of operating Systems.	**3**	**3**	**4**	**1**	**2**
4C.	Explain the non-functional requirements that need to be addressed in the design of an embedded system.	**2**	**3**	**4**	**5**	**2**
5A.	Illustrate the utility of embedded systems in the automotive domain with an example.	**4**	**5**	**4**	**1**	**3**
5B.	Calculate the average waiting time and average turnaround time for the primitive priority scheduling algorithm with the CPU burst time, arrival time, and priority given below for handling different jobs.	**3**	**3**	**4**	**1**	**3**

	<table><tr><th>Job</th><th>Burst Time (ms)</th><th>Priority</th><th>Arrival Time (ms)</th></tr><tr><td>A</td><td>10</td><td>5</td><td>0</td></tr><tr><td>B</td><td>6</td><td>2</td><td>0</td></tr><tr><td>C</td><td>7</td><td>4</td><td>1</td></tr><tr><td>D</td><td>4</td><td>1</td><td>1</td></tr><tr><td>E</td><td>5</td><td>3</td><td>2</td></tr></table>					
5C.	Give an overview of the different market players in the automotive embedded application domain.	**3**	**5**	**3**	**1**	**2**

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