R22

Code No: R22A0351

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech I Semester Supplementary Examinations, June 2025
Robotics & Automation
(CSE, IT, CSIT, CSE-CS, CSE-AIML, CSE-DS, CSE-IOT & B.Tech-AIML)

Roll No										

Time: 3 hours **Max. Marks: 60**

Note: This question paper contains two parts A and B
Part A is compulsory which carries 10 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

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		PART-A (10 Marks) **(Write all answers of this part at one place)**	**BCLL**	**CO(s)**	**Marks**
1	A	Name the key components of Embedded System hardware architecture.	**L1**	**CO-I**	**[1M]**
	B	Define a real-time embedded system.	**L1**	**CO-I**	**[1M]**
	C	What is the role of gears in power transmission for robots?	**L1**	**CO-II**	**[1M]**
	D	Name a few types of robotic sensors and their functions.	**L1**	**CO-II**	**[1M]**
	E	Explain the memory organization in AVR microcontrollers.	**L2**	**CO-III**	**[1M]**
	F	How do I/O ports function in an AVR microcontroller?	**L1**	**CO-III**	**[1M]**
	G	What are interrupts, and how are they handled in ARM processors?	**L1**	**CO-IV**	**[1M]**
	H	Describe the vector table in ARM architecture.	**L2**	**CO-IV**	**[1M]**
	I	What challenges do robots face when planning uncertain movements?	**L1**	**CO-V**	**[1M]**
	J	Describe the dynamics of movement in robotic systems.	**L2**	**CO-V**	**[1M]**
		PART-B (50 Marks) **SECTION-I**			
2	A	Discuss the advantages and disadvantages of using an embedded controller versus a microcontroller in a project.	**L2**	**CO-I**	**[5M]**
	B	Explore the future of embedded systems, considering potential advancements and their impact on industries such as healthcare, automotive, and consumer electronics.	**L2**	**CO-I**	**[5M]**
		OR			
3	A	What are the primary differences between robots and robotics? How do microprocessors differ from microcontrollers?	**L1**	**CO-I**	**[2M+3M]**
	B	What is an embedded controller? Give an example of a real-time application of an embedded system.	**L1**	**CO-I**	**[2M+3M]**

SECTION-II

4		Explain the working of servo motor.	**L4**	**CO-II**	**[10M]**
		OR			
5	A	List some common applications of robots in industry. What software is commonly used for robot programming?	**L1**	**CO-II**	**[5M]**
	B	What is the working of stepper motor.	**L1**	**CO-II**	**[5M]**

SECTION-III

6	A	Provide an overview of the AVR RISC microcontroller architecture, highlighting its key features and advantages over other architectures.	**L2**	**CO-III**	**[5M]**
	B	Discuss the different families within the AVR microcontroller series, including their specifications and target applications.	**L2**	**CO-III**	**[5M]**
		OR			
7	A	Analyze the pin diagram of an AVR microcontroller, detailing the purpose of each pin and its significance in interfacing with other components.	**L4**	**CO-III**	**[5M]**
	B	Explain the function and organization of the register file in AVR microcontrollers, including the types of registers available.	**L2**	**CO-III**	**[5M]**

SECTION-IV

8	A	Explore the impact of pipelining on instruction execution latency in ARM processors, including challenges like data hazards and techniques for hazard mitigation.	**L2**	**CO-IV**	**[5M]**
	B	Analyze the importance of ARM processors in modern computing, particularly in mobile and embedded systems, and discuss future trends in ARM technology.	**L4**	**CO-IV**	**[5M]**
		OR			
9	A	How does the ARM architecture differ from other processor architectures? What are general-purpose registers in ARM, and how many are there?	**L1**	**CO-IV**	**[2,3M]**
	B	What is the significance of the CPSR flags in ARM processors? How does pipelining improve the performance of ARM processors?	**L1**	**CO-IV**	**[2,3M]**

SECTION-V

10	A	Discuss the concept of robotic perception, including the sensors and algorithms used to enable robots to understand their environment.	**L2**	**CO-V**	**[5M]**
	B	Explain the process of localization for robots, detailing techniques such as GPS, odometry, and SLAM (Simultaneous Localization and Mapping).	**L2**	**CO-V**	**[5M]**
		OR			
11	A	Analyze how robots configure their operating space,	**L4**	**CO-V**	**[5M]**

	including methods for spatial awareness and environmental interaction.			
B	Elaborate on the significance of mapping in robotics, including the different types of maps (metric vs. topological) and their uses in navigation.	**L2**	**CO-V**	**[5M]**

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