

**Model Question Paper-1 with effect from 2023-24 (CBCS Scheme)**

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**Third Semester B.E. Degree Examination**  
**Fundamentals and Applications of Robotics**

**TIME: 03 Hours****Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

<b>Module – 1</b>			<b>M</b>	<b>L</b>	<b>C</b>
<b>Q.1</b>	<b>(a)</b>	Discuss the fundamental laws of robotics and their implications on robot design and operation.	10	L3	CO1
	<b>(b)</b>	Provide a brief historical overview of robotics, highlighting key milestones and developments.	10	L2	CO1
<b>OR</b>					
<b>Q.2</b>	<b>(a)</b>	Highlight advantages and disadvantages of robots in various domains such as manufacturing, healthcare, and service industries.	10	L3	CO1
	<b>(b)</b>	Evaluate the role of robots in addressing societal and environmental challenges, such as automation of repetitive tasks and disaster response.	10	L4	CO1
<b>Module – 2</b>					
<b>Q.3</b>	<b>(a)</b>	Define the anatomy of a robot and explain the significance of robot configurations.	10	L2	CO2
	<b>(b)</b>	Discuss the differences between polar, cylindrical, Cartesian, and jointed arm configurations.	10	L3	CO2
<b>OR</b>					
<b>Q.4</b>	<b>(a)</b>	Discuss the importance of roll, pitch, and yaw movements in robot navigation and manipulation.	10	L3	CO2
	<b>(b)</b>	Define direct and inverse kinematics in the context of robotics and explain their significance.	10	L2	CO2
<b>Module – 3</b>					
<b>Q.5</b>	<b>(a)</b>	Compare and contrast hydraulic, pneumatic, and electric drive systems used in robotics, highlighting their advantages and limitations.	10	L3	CO3

	(b)	Classify end effectors commonly used in robotics, such as mechanical grippers, vacuum grippers, magnetic grippers, and adhesive grippers.	10	L4	CO3
<b>OR</b>					
Q.6	(a)	Analyze the benefits of playback with continuous path control in applications such as CNC machining and painting.	10	L4	CO3
	(b)	Explain the concept of degrees of freedom (DoF) in robot hands, distinguishing between 1 DoF, 2 DoF, and multiple DoF designs, and discuss their applications.	10	L3	CO3
<b>Module – 4</b>					
Q.7	(a)	Discuss the applications of helicopters in aerial robotics, emphasizing their roles in surveillance, search and rescue, and transportation.	10	L3	CO4
	(b)	Describe the capabilities and applications of wheeled mobile robots in various industries, including logistics, agriculture, and manufacturing.	10	L2	CO4
<b>OR</b>					
Q.8	(a)	Explain how hospital robots are used for tasks such as patient transportation, medication delivery, and disinfection, enhancing operational efficiency and reducing the risk of infections.	10	L3	CO4
	(b)	Analyze the challenges and opportunities in the development of underwater and floating robots for tasks such as ocean exploration, marine research, and offshore inspections.	10	L4	CO4
<b>Module – 5</b>					
Q.9	(a)	Evaluate the advantages of robotic welding and assembly systems in manufacturing industries, considering factors such as precision, speed, and quality control.	10	L4	CO5
	(b)	Explore the applications of robotics in agriculture, such as precision farming, crop monitoring, and harvesting, highlighting their potential to increase yields and reduce resource consumption.	10	L3	CO5
<b>OR</b>					
Q.10	(a)	Evaluate the role of collaborative robots (cobots) in computer-integrated manufacturing, including their impact on worker safety, productivity, and job satisfaction.	10	L4	CO5
	(b)	Analyze the potential impact of autonomous robotics on society, considering factors such as job displacement, safety, and ethical considerations.	10	L4	CO5