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|  | |  | | **GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY**  (**ANAUTONOMOUSINSTITUTION**)  **(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu) (Accredited by NAAC with“A” Grade, NBA (EEE,ECE &ME)& ISO9001:2008CertifiedInstitution)** | |
| **QUESTION BANK (DESCRIPTIVE)**  **INTRODUCTION TO ROBOTICS**  **(Common to CSE, AI&ML, CS, DS)**  **Subject Name with Code: 22A0333Tb Branch: CSE**  **Year& Semester:IV-I Régulation:RG22**  **Name of the Faculty:Mr. P. Amos A.Y 2025-26** | | | |
| **UNIT – I**  **Automation and Robotics:** Robot-Basic concepts, Need, Law, History, Anatomy, specifications. Robot  configurations-cartesian, cylinder, polar and articulate. Robot wrist mechanism,  Precision, accuracy, repeatability, work and volume of robot | | | | | |
|  | **UNIT-1: Automation and Robotics** | | | | |
| **S. No** | | **Question** | | **[BT Level] [CO][ Marks]** |
| **Descriptive Questions (Long)** | | | | |
| **1** | | With a neat sketch Describe the Cartesian, cylindrical, polar, and articulated robots ? | | **[L2][CO1][12M]** |
| **2** | | . Describe the anatomy of a robot, and apply your understanding to identify which part ensures the gripping of boxes and justify your answer? | | **[L2[CO1][12M]** |
| **3** | | Carrying out the basic concepts of robotics and discuss the various needs for using robots ? | | **[L2][CO1][12M]** |
| **4** | | Given a robot system, interpret its basic components and explain the function of each component using a block diagram.? | | **[L2][CO1][12M]** |
| **5** | | With neat sketch explain the construction and working of a robot wrist mechanism.? | | **[L2][CO1][12M]** |
| **6** | | A factory wants to reduce mistakes made by workers. Which type of automation would you use, and why? Give a real example to explain your choice.? | | **[L2][CO1][12M]** |
| **7** | | Discuss the Robot categories with neat sketches ? | | **[L2][CO1][12M]** |
| **8** | | Execute the Robot Precession, accuracy and repeatability in your own words? | | **[L2][CO1][12M]** |
| **9** | | Express the work volume of a Robot? | | **[L2][CO1][12M]** |
| **10** | | Explain the specifications of robot in industry? | | **[L2][CO1][12M]** |
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|  | **UNIT -1** |  |
| **S.No.** | **Question** | **[BT Level] [CO]**  **[ Marks]** |
| **2 Marks Questions (Short)** | | |
| **1.** | Define Robot ? | **[L1] [CO1] [2M]** |
| **2.** | Discuss the function of Robot ? | **[L2] [CO1] [2M]** |
| **3.** | List the rules of Robot? | **[L1] [CO1] [2M]** |
| **4.** | List the advantages and disadvantages of Robot? | **[L1] [CO1] [2M]** |
| **5.** | Discuss specifications of a industrial Robot? | **[L2] [CO1] [2M]** |
| **6.** | Define Work volume? | **[L1] [CO1] [2M]** |
| **7.** | State the Automation? | **[L1] [CO1] [2M]** |
| **8.** | List the types of Automation? | **[L1] [CO1] [2M]** |
| **9.** | Describe the Different types of Robots? | **[L2] [CO1] [2M]** |
| **10.** | Identify the commonly used Robot Configuration? | **[L2] [CO1] [2M]** |

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# UNIT – II: END EFFECTORS-CLASSIFICATION

**End effectors-Classification**- Types of Mechanical actuation, Gripper design, Robot drive system Types,   
 Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation.

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| **S. No.** | **Question** | **[BT Level] [CO][ Marks]** |
| **Descriptive Questions (Long)** | | |
| **1.** | Explain the different types of end effectors used in robotics with examples.? | **[L2]CO2[12M]** |
| **2.** | Discuss the advantages and disadvantages of different mechanical actuation types used in robotics.? | **[L2]CO2[12M]** |
| **3.** | Discuss different types of robot drive systems and explain their applications.? | **[L2]CO2[12M]** |
| **4.** | Describe the design aspects of mechanical grippers and their applications in robotics.? | **[L2]CO2[12M]** |
| **5.** | Describe the various types of robot links and their functions.? | **[L2]CO2[12M]** |
| **6.** | Explain the Electric, hydraulic, and pneumatic drive systems used in robots.? | **[L2]CO2[12M]** |
| **7.** | Explain the types of mechanical actuation methods used in robotic end effectors.? | **[L2]CO2[12M]** |
| **8.** | Discuss different types of robot joints and explain their importance in robot movement.? | **[L2]CO2[12M]** |
| **9.** | Describe the main position feedback devices used in robotics and explain the principle behind each device’s operation.? | **[L2]CO2[12M]** |
| **10.** | Describe the significance of motion interpolation in robot path planning and control.? | **[L2]CO2[12M]** |

SHORT ANSWERS:

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|  | **UNIT -II** |  |
| **S.No.** | **Question** | **[BT Level] [CO] [ Marks]** |
| **2 Marks Questions (Short)** | | |
| **1.** | Define Actuator? | **[L1] [CO2] [2M]** |
| **2.** | List the types of Robot drive system? | **[L1] [CO2] [2M]** |
| **3.** | Define End Effector? | **[L1] [CO2] [2M]** |
| **4.** | State the function of a Gripper? | **[L1] [CO2] [2M]** |
| **5.** | List the types of grippers? | **[L1] [CO2] [2M]** |
| **6.** | Identify some feed back device used in robotics? | **[L2] [CO2] [2M]** |
| **7.** | List out Robot links? | **[L1] [CO2] [2M]** |
| **8.** | State the Robot Joints? | **[L1] [CO2] [2M]** |
| **9.** | State the types of drive system for Robots? | **[L1] [CO2] [2M]** |
| **10.** | Recognize the Examples of Robot End Effectors? | **[L2] [CO2] [2M]** |

**UNIT-III ROBOT KINEMATICS AND CONTROL**

Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D Transformation-Scaling, Rotation, Translation Homogeneous transformation. Control of robot manipulators – Point to point, Continuous Path Control, Robot programming

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| **UNIT-III** | | | |
| **S. No.** | **Question** | **[BT Level] [CO][ Marks]** | |
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| **1.** | Illustrate Forward Kinematics Equations? | **[L3] [CO3][12M]** |
| **2.** | Differentiate between forward kinematics and reverse (inverse) kinematics in robotics by analyzing their purpose, input, and output.? | **[L2] [CO3][12M]** |
| **3.** | Differences between point-to-point control and continuous path control in robot ? | **[L2] [CO3][12M]** |
| **4.** | Determine the Robot arm with 2D transformations are required at each step and explain why? | **[L4] [CO3][12M]** |
| **5.** | Determine the Robot arm with 3D transformations are required at each step and explain why? | **[L4] [CO3][12M]** |
| **6.** | Express the Robot programming language using VAL? | **[L4] [CO3][12M]** |
| **7.** | . Discuss different types of Robot Programming Methods describe them? | **[L2] [CO3][12M]** |
| **8.** | Illustrate the Inverse Kinematics Equations? | **[L3] [CO3][12M]** |
| 9 | Explain the Robot programming commands? | **[L2] [CO3][12M]** |
| 10 | Describe the classifications of robot languages? | **[L2] [CO3][12M]** |

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|  | **UNIT -III** |  |
| **S.No.** | **Question** | **[BT Level] [CO] [ Marks]** |
| **2 Marks Questions (Short)** | | |
| **1.** | Define Forward kinematics? | **[L1] [CO3] [2M]** |
| **2.** | Define inverse kinematics? | **[L1] [CO3] [2M]** |
| **3.** | List any two differences between forward kinematics and inverse kinematics in robotics and explain them in simple words.? | **[L1] [CO3] [2M]** |
| **4.** | Explain what scaling is in 2D transformations and describe how it changes the size of an object? | **[L2] [CO3] [2M]** |
| **5.** | Explain what Rotation is in 2D transformations and describe how it changes the size of an object? | **[L2] [CO3] [2M]** |
| **6.** | Translation in 3D transformations and describe how it changes the position of an object? | **[L2] [CO3] [2M]** |
| **7.** | List out robot programming methods | **[L1] [CO3] [2M]** |
| **8.** | Define continuous path control? | **[L1] [CO3] [2M]** |
| **9.** | Define the kinematics and give types of Robot kinematics? | **[L1] [CO3] [2M]** |
| **10.** | Write the function of Robot Trajectories ? | **[L1] [CO3] [2M]** |

UNIT -IV ROBOT SENSORS

Sensors in robot – Touch sensors -Tactile sensor – Proximity and range sensors. Force sensor-Light sensors, Pressure sensors, Introduction to Machine Vision and Artificial Intelligence.

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| UNIT -IV | | |
| **S. No.** | **Question** | **[BT Level] [CO][ Marks]** |
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| **1.** | Explain the characteristics of a Robotic sensors ? | **[L2] [CO4] [12M]** |
| **2.** | Describe the working of any proximity sensor with a neat sketch ? | **[L2] [ CO4] [12M]]** |
| **3.** | Discuss the working of any Touch sensor with a neat sketch? | **[L2] [ CO4 [12M]]** |
| **4.** | Explain the working of any Range sensor with a neat sketch? | **[L2] [ CO4] [12M]]** |
| **5.** | Describe the working of any Force sensor with a neat sketch? | **[L2] [CO2] [2M]** |
| **6.** | Explain the working of any Light sensor with a neat sketch? | **[L2] [ CO4] [12M]]** |
| **7.** | Describe the working of any Pressure sensor with a neat sketch? | **[L2] [ CO4] [12M]]** |
| **8.** | Describe the machine vision techniques used in Robotics with a neat block diagram | **[L2] [ CO4] [12M]]** |
| 9 | Explain the functions of machine vision system and applications of the sensors | **[L2] [ CO4 [12M]]** |
| 10 | Describe the selection criteria of a sensor and Expalin desirable features of sensors ? | **[L2] [ CO4 [12M]]** |

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|  | **UNIT-IV** |  |
| **S.No.** | **Question** | **[BT Level] [CO] [ Marks]** |
| **2 Marks Questions (Short)** | | |
| **1.** | Define sensor and list out classification of robot sensors | **[L1] [ CO4] [2M]** |
| **2.** | List the different types of tactile sensors | **[L1] [ CO4] [2M]** |
| **3.** | Define touch sensor | **[L1] [[ CO4] [2M]** |
| **4.** | State the Functions of proximity sensor? | **[L1] [ CO4] ] [2M]** |
| **5.** | List the proximity sensor? | **[L2] [ CO4] ] [2M]** |
| **6.** | Define range sensor? | **[L1] [ CO4] [2M]** |
| **7.** | State the purpose of sensor in Robotics? | **[L1] [ CO4] [2M]** |
| **8.** | List the types of encoders? | **[L1] [ CO4] [2M]** |
| **9.** | Write the applications of sensors? | **[L1] [ CO4] [2M]** |
| **10.** | Write the function of machine vision system? | **[L1] [ CO4] [2M]** |

UNIT -V ROBOT APPLICATIONS

Industrial applications of robots-Medical, Household, Entertainment, Space, Underwater, Defense, Disaster management.   
 Applications, Micro and Nanorobots, Future Applications.

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| UNIT -V | | |
| **S. No.** | **Question** | **[BT Level] [CO][ Marks]** |
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| **1.** | How would you understand the micro-robots to perform targeted drug delivery in cancer treatment? | **[L2] [CO5] [12M]** |
| **2.** | Describe how you would use a household robot to automate daily cleaning tasks in a smart home.? | **[L2] [CO5] [12M]]** |
| **3.** | Imagine you are designing a theme park. How could you understand the robotic technology to enhance the visitor experience? | **[L2 [CO5] [12M]]** |
| **4.** | Explain how you would use robotic arms or rovers to collect soil samples from the surface of Mars? | **[L2] [[CO5] [12M]** |
| **5.** | Describe the underwater robotics to explore and map deep-sea ecosystems.? | **[L2][CO5] [12M ]** |
| **6.** | How can robotic drones be applied to improve surveillance and safety in border security operations? | **[L2] [CO5] [12M ]** |
| **7.** | Suggest how rescue robots could be utilized in earthquake-hit areas to locate and assist trapped victims.? | **[L2] [CO5] [12M]** |
| **8.** | Explain the concept of nanorobots to develop a solution for detecting and repairing internal injuries in the human body? | **[L2] [CO5] [12M]]** |
| 9 | Propose a future application of AI-powered robots in agriculture and explain how it would improve productivity.? | **[L2] [CO5] [12M]]** |
| 10 | Describe a scenario where robots with micro, underwater, and disaster management capabilities are applied together in a flood rescue mission.? | **[L2] [CO5] [12M]]** |

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|  | **UNIT-V** |  |
| **S.No.** | **Question** | **[BT Level] [CO] [ Marks]** |
| **2 Marks Questions (Short)** | | |
| **1.** | Identify the common use of robots in the manufacturing industry? | **[L2] [CO5] ] [2M]** |
| **2.** | The robots used in the field of medicine Give one example | **[L2] [CO5] [2M]** |
| **3.** | List the role do robots play in space exploration | **[L1] [CO5] [2M]** |
| **4.** | Why are robots often used in dangerous environments, such as bomb disposal or nuclear cleanup? | **[L1] [CO5] [2M]** |
| **5.** | Explain the advantage of using robots in repetitive or precision-based tasks? | **[L2] [CO5] [2M]** |
| **6.** | Describe one-way robots are being used in military or defense operations. | **[L2] [CO5] [2M]** |
| **7.** | How are autonomous vehicles (self-driving cars) considering a form of robotic technology? | **[L2] [CO5] [2M]** |
| **8.** | Describe how Robots are used in the film industry? | **[L2] [CO5] [2M]** |
| **9.** | Identify how Entertainment Robot designed for interaction with children | **[L2] [CO5] [2M]** |
| **10.** | Describe the underwater Robots in Marine research? | **[L2] [CO5] [2M]** |

**Signature of the Staff:**

**Signature of Department Academic Committee Member 1:**

**Signature of Department Academic Committee Member 2:**

**Signature of Department Academic Committee Member 3:**