

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2024

Course: B. Tech. Branch : AI & DS and Allied branches Semester: V

Subject Code & Name: Sensors & Robotics Technology (BTAIPE504C)

Max Marks: 60

Date: 08/07/2024

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

| | (Level/CO) | Marks |
|--|------------|-----------|
| Q. 1 Solve Any Two of the following. | | 12 |
| A) Define measurement and discuss its importance in engineering and scientific applications. Provide examples of different types of measurements. | CO1 | 6 |
| B) What factors should be considered when selecting transducers for specific measurement applications? Discuss parameters such as range, sensitivity, frequency response and environmental conditions. | CO1 | 6 |
| C) Discuss the fundamental principles of operation for thermocouples. What are the various characteristic features of it? | CO1 | 6 |
| Q.2 Solve Any Two of the following. | | 12 |
| A) Explain the function of electric relays in electrical circuits. Discuss the working principle of relays and how they control high-power electrical devices. | CO2 | 6 |
| B) What is need of Instrumentation Amplifier? Explain instrumentation amplifier with diagram. | CO2 | 6 |
| C) Define data acquisition systems and discuss the essential components of it. | CO2 | 6 |
| Q. 3 Solve Any Two of the following. | | 12 |
| A) Explain the classification of robots based on their application domains. Also discuss the specific tasks each type of robot is designed to perform. | CO3 | 6 |
| B) Explain the principle of hydraulic drive in robots. Discuss advantages and disadvantages of hydraulic drive technology in robotic systems. | CO3 | 6 |
| C) Design a block diagram illustrating a robotic material handling system. Highlight key components and their interactions in the system. | CO3 | 6 |

Q.4 Solve Any Two of the following.

12

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| A) Define robot dynamics and its significance in robotic motion control. Discuss factors affecting robot dynamics. | CO4 | 6 |
| B) Explain the concept of forward kinematics in robotics. Provide an example of how forward kinematics are used to calculate the end-effector position of a robot arm. | CO4 | 6 |
| C) Explain joint motion control of robot in brief. | CO4 | 6 |

Q. 5 Solve Any One of the following.

12

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| A) Explain the BFS algorithm and its application in robotics. Give an example where BFS can be used to navigate a robot in a grid environment. | CO5 | 6 |
| B) What is a mechanical gripper? Explain internal grippers in brief. | CO5 | 6 |
| C) What is reinforcement learning in robotics? Give one example. | CO5 | 6 |

***** End *****