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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI- THEORY EXAMINATION (2025 - 2026)

Subject: Robotics Design Mechanism

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

(1.1) What is a humanoid robot designed to resemble?(CO1,K2)

1

(a) An animal

(b) A machine

(c) A human

(d) A car

(1.2) What is the main function of a mobile robot?

1

(a) To perform tasks inside a factory

(b) To move around and perform tasks in different environments

(c) To clean floors

(d) To assist in surgery

(1.3) What is one disadvantage of electromagnetic drive systems in robotics?(CO2,K1)

1

(a) High maintenance cost

(b) High energy consumption

(c) Limited speed control

(d) Complex and expensive hardware

(1.4) What is the primary function of an electric drive in robotics?

1

(a) To convert electrical energy into mechanical motion

(b) To store electrical energy for later use

(c) To monitor the robot's sensors

(d) To supply power to the robot's camera systems

(1.5) What is the principle of operation of a linear variable differential transformer

1

(LVDT) sensor? (CO3,K3)

- (a) Uses light to detect displacement
- (b) Measures changes in resistance due to displacement
- (c) Measures the change in inductance caused by displacement
- (d) Detects displacement through capacitive changes

(1.6) What is the primary purpose of vibrational transportation in robotics? 1

- (a) To increase the speed of the robot
- (b) To move parts or materials using vibration
- (c) To power the robot's actuators
- (d) To detect objects in the environment

(1.7) In liquid feeding systems, the flow rate is often controlled using a: (CO4,K4,K5) 1

- (a) Rotary valve
- (b) Flow meter
- (c) Vibratory feeder
- (d) Screw conveyor

(1.8) For feeding materials with varying flow properties, which of the following devices can be used? 1

- (a) Positive displacement pump
- (b) Vibrating feeder
- (c) Batch tank
- (d) Belt conveyor

(1.9) What role do vision systems play in robotic assembly?(CO5,K3) 1

- (a) To monitor temperature levels in the environment
- (b) To detect part defects and misalignments
- (c) To measure the strength of assembled components
- (d) To determine the weight of parts

(1.10) What is typically used in robotic systems for part handling and positioning during automatic assembly?(CO5,K3) 1

- (a) Conveyors and cameras
- (b) Grippers and suction cups
- (c) Hydraulic presses
- (d) Bearings and gearboxes

2. Attempt all parts:-

(2.1) What is an autonomous robot, and how does it differ from a manually controlled robot? 2

(2.2) Describe one disadvantage of using electromagnetic drive systems in robotics.(CO2, K2) 2

(2.3) What is the role of a capacitive displacement sensor in robotics?(CO3, K3) 2

(2.4) Explain the role of feeders in robotic systems handling granular materials.(CO4,K4,K5) 2

(2.5) What is the role of actuators in robotic systems?(CO5,K3) 2

SECTION-B

30

Answer any one of the following:-

(3.1) Explain the structure of the Manipulator.(CO1,K1,K2) 6

(3.2) Explain different level of Autonomy in Robotics.(CO1,K1,K2) 6

Answer any one of the following:-

(3.3) Compare and contrast different types of drive systems in robotics. Highlight the key differences in performance, efficiency, and applications.(CO2,K2) 6

(3.4) Explain the basic working principle of an electric drive system in robotics. Discuss the types of electric motors used and their functions in robotic applications.(CO2,K2) 6

Answer any one of the following:-

(3.5) Define Force Sensors. What are the advantages and limitations of using force sensors in robotic applications? (CO3,K3) 6

(3.6) Compare the use of force sensors in human-robot interaction and industrial robotics.(CO3,K3) 6

Answer any one of the following:-

(3.7) What is the role of mapping and localization in logical orientation for autonomous robots?(CO4,K2) 6

(3.8) Define rods .What materials are commonly used for rods in robotics, and why are they chosen? 6

Answer any one of the following:-

(3.9) Explain the concept of manipulator dynamics and its importance in robotics.(CO5,K3) 6

(3.10) How do friction and damping affect the dynamics of a robotic manipulator?(CO5,K3) 6

SECTION-C

50

4. Answer any one of the following:-

(4.1) What are the various components of Robotics System. What are the advantages and disadvantages of Robot. (CO1,K1,K2) 10

(4.2) Define Robot Manipulator. What are the different types of Joints? Differentiate between Holonomic, Non-Holonomic and Redundant.(CO1,K1,K2) 10

5. Answer any one of the following:-

(5.1) Explain the working principle of Hydraulic Drives and write down their advantages and disadvantages. (CO2,K2) 10

(5.2) What is automatic vibration damping in robotics? Explain its importance in maintaining the performance and precision of robotic systems.(CO2,K2) 10

6. Answer any one of the following:-

(6.1) Explain Temperature sensors used in robotics Discuss their working principles, advantages, and limitations in robotic applications. (CO3, K3) 10

(6.2) What are the key considerations for Transporting devices in Robotics and what are their real-world applications.(CO3, K3) 10

7. Answer any one of the following:-

- (7.1) Explain the different types of Wire used in robotics and write down their advantages and disadvantages.(CO4,K4,K5) 10
- (7.2) Explain the key properties of Wire and what are their different key functions. (CO4,K4,K5) 10
8. Answer any one of the following:-
- (8.1) Define Gripper and Guides. What are the factors to consider while designing Grippers and write down the applications of Grippers and Guides.(CO5,K1,K3) 10
- (8.2) Discuss the importance of the end effector in a robotic system and explain different types of end effectors used in robotics.(CO5,K3) 10

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