

Seat  
No.

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मठ - 053

**ELECTIVE - II**  
**Introduction to Robotics**  
**(New) (1313)**

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each units.
5. Draw neat sketches whenever necessary.
6. Assume suitable data whenever necessary.

**UNIT - I**

1. Define Robot and what is the need of Industrial Robot. **10**
2. What is ISP and FSP Burmester theories for robots Give its application. **10**
3. Explain the following in detail. **10**
  - a) Spatial Mechanism
  - b) Newtonian's lagrangian technique

**UNIT - II**

1. Explain Robot configuration with neat sketches. **10**
2. What is the function of Robot ? and explain how does Robot differ's from an automated machine ? **10**
3. a) Explain "continuous path control" of Robot. **5**  
b) The telescopic arm of an industrial Robot obtains total range of rotation of  $120^\circ$ . The Robot has a 12-bit storage capacity for the axis. The arm fully extends to 1500mm and fully retracts to 750mm from the pivot point. Determine the Robots control resolution for the axis. **5**
  - i) In degrees of Rotation
  - ii) On linear scale in fully extended and retracted position.

**UNIT - III**

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| 1. | a) Explain following terms.                                      | 10 |
|    | a) Power transmission system.                                    |    |
|    | b) Position sensors.   |    |
| 2. | Explain following Robot applications briefly.                    | 10 |
|    | a) Welding   |    |
|    | b) Spray painting.   |    |
| 3. | What are the features and applications of "Hydraulic Actuators". | 10 |

**UNIT - IV**

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|----|--|----|
| 1. | Explain following with neat sketches.                | 10 |
|    | a) Mechanical Grippers with interchangeable fingers. |    |
|    | b) Mechanical Grippers with two fingers.             |    |
| 2. | Explain proximity sensors and Textile sensors.       | 10 |
| 3. | Explain the characteristics of sensing device.       | 10 |

**UNIT - V**

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|----|---|----|
| 1. | What is lead through programming method ? Write its advantages and disadvantages over other programming method. | 10 |
| 2. | Explain Robot Language structure with suitable diagram.   | 10 |
| 3. | Explain "WAIT, SIGNAL, and DELAY commands with suitable examples.   | 10 |

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