**[5926]-264**

# T.E. (Honors)
# ROBOTICS
## Principles of Robotics
## (2019 Pattern) (Semester - I) (304181HR)

*Time : 2½ Hours]*                                                                                   *[Max. Marks : 70*

*Instructions to the candidates:*
1) *Attempt all questions : Q.1 or Q.2, Q.3 or Q.4. Q.5 or Q.6 & Q.7 or Q.8.*
2) *Draw sketches where required.*

**Q1)** a)   State the factors in selection and design of grippers.                              **[9]**

  b)   Explain with neat sketch Mechanical grippers.                                    **[9]**

**OR**

**Q2)** a)   State and explain various tools used as end effectors.                        **[9]**

  b)   Explain with neat sketch Tactile Sensor Gripper.                                **[9]**

**Q3)** a)   Explain with neat sketch piezo electric sensors.                              **[8]**

  b)   Explain with neat sketch LVDT sensor.                                          **[9]**

**OR**

**Q4)** a)   Explain with neat sketch Force sensors.                                        **[9]**

  b)   Explain with neat sketch range sensors.                                        **[8]**

**Q5)** a)   Enlist steps in forward kinematic analysis.                                    **[9]**

  b)   Explain with neat sketch D-H parameter.                                        **[9]**

**OR**

**Q6)** a)   State properties of generalised composite Rotation matrix.                    **[9]**

  b)   A 2 DOF planar RR manipulator has $L_1 = 120$mm & $L_2 = 75$mm. Determine joint angles using geometric approach, so that face end is located at ( 100, 70).                                                            **[9]**

*Q7)* a) Explain various Image processing Techniques is Robotics . **[9]**

b) State and explain economic aspects in Robotics. **[8]**

OR

*Q8)* a) What is Robot safety. Explain 5 groups of Humans that are at risk of direct injury from Robot. **[9]**

b) Write notes on (any 2). **[8]**

    i) Agriculture & farming.

    ii) Home sector.

    iii) Service sector.

    iv) Research & exploration.

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