**Roll No.** | | | | | | | | | | | | | **Total No. of Pages: 02**

**Total No. of Questions: 08**

**M.Tech. (ME) (Sem. – 3)**

# AUTOMATION AND ROBOTICS

**Subject Code: MTME-206**

**M Code: 74982**

**Date of Examination: 16-12-2022**

**Time: 3 Hrs.** **Max. Marks: 100**

**INSTRUCTIONS TO CANDIDATES:**

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) Present graphically and explain the various types of production automation as a function of production volume and product variety.

   b) Why the industrial automation is necessary in today's production scenario. Elaborate the various factors that oppose industrial automation.

2. a) What are the various cost associated with a manufacturing unit. Discuss and elaborate in detail.

   b) What is buffer storage? Why it is required in automated lines?

3. Discuss the following types of work-part transport systems used in industry

   a) Continuous transfer

   b) Intermittent and synchronous transfer

   c) Asynchronous or power and feed transfer.

4. An eight station rotary machine operates with an idle cycle time of 20 s. The frequency of line stop occurrence is 0.06 stop/cycle on average. When a stop occurs, it takes an average of 3 min to make repairs. Determine the followings:

   a) Average production time $T_p$

   b) Average production rate $R_p$

c) Line efficiency E

d) Proportion of downtime D

5. a) What is the rotation matrix for a rotation of 45° about the OZ axis, followed by the rotation of 30° about the OX axis, followed by the rotation of 90° about the OY axis?

b) Sketch the 'Geneva' and 'Ratchet &Paul' Mechanism.

6. a) Graphically represent the followings:

i) One dimensional representation of control and special resolution

ii) One dimensional representation of accuracy and resolution

iii) Unidirectional repeatability

iv) Bidirectional repeatability

b) Sketch the work envelop of the various robots configurations.

7. a) Write the ASIMOV'S laws of Robots and sketch and configuration of a robotic arm.

b) Design a composite rotation matrix when the joint is rotated about an arbitrary axis.

8. Write a short note on the following:

a) Group technology

b) Automated guided vehicles



**NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.**