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

Total No. of Questions : 08

M.Tech. (Mechanical Engineering) (Sem.–3)

AUTOMATION & ROBOTICS

Subject Code : MTME-206

M.Code : 74982

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

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

Q1. a) Discuss the various types of automation systems used in Indian industry.

b) What are the factors that make production automation a feasible and attractive alternative to manual method of manufacturing?

Q2. a) Explain the ten strategies to be employed to improve productivity in manufacturing operations.

b) A production machine is operated 65 h/week at full capacity. Its production rate is 20units/h. During a certain week, the machine produced 1000 good parts and was idle the remaining time.

a. Determine the production capacity of the machine.

b. What was the utilization of the machine during the week under consideration?

Q3. A circular indexing machine performs 10 assembly operations at 10 separate stations. The total cycle time, including transfer time between stations is 10 s. Station break down with a probability p=0.007, which can be considered equal for all 10 stations. When this work stoppage occurs, it takes an average of 2 min to correct the fault. Parts are not normally removed from the machine when these stop occurs. Compute the proportion of down time, the efficiency, and the production rate of this circular indexing machine.

Q4. a) Discuss the Upper bound approach and Lower bound approach for the analysis of transfer lines with storage.

b) Discuss the term Starving of Stations and Blocking of Stations.

Q5. a) With the help of neat diagram, explain the basic anatomy of an industrial robot.

b) Define and explain the following with respect to the position of end effector of robotic arm :

a. Spatial Resolution

b. Precision and Accuracy

c. Unidirectional and Bidirectional repeatability

Q6. For the point 3i+7j+5k perform the following operations and sketch :

a) Rotate 30° about Z axis

b) Rotate 45° about Y axis

c) Rotate 90° about Z axis

d) Translate 8 units along the Y axis

e) Rotate 30° about X, then translate 6 along Y

f) Translate 6 along Y, then rotate 30° about X

Q7. a) Explain with the help of neat sketch, the various types of configurations used in industrial robots.

b) Explain with the help of neat sketch the working of stepper motor used in robots.

Q8. Write short notes on the following :

a) Robot Programming

b) Flexible manufacturing automation

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