

B.TECH
(SEM-VIII) THEORY EXAMINATION 2022-23
AUTOMATION & ROBOTICS

Time: 3 Hours

Total Marks: 100

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- (a) Discuss the term AUTOMATION with respect to production system.
- (b) Discuss need for automation.
- (c) What do you mean by part handling and feeding in Automation?
- (d) Explain the term TRANSFER LINE in automation.
- (e) Discuss Laws of Robotics.
- (f) Describe the meaning of actuators.
- (g) Explain the Mechanical switches.
- (h) Discuss briefly Flow control valves.
- (i) Define Teach pendant.
- (j) State the reason for using Robots in industries.

SECTION B

2. Attempt any three of the following: 10x3=30

- (a) Explain various considerations which should be taken into account while making a decision to automate a facility.
- (b) Examine the various types of transfer devices used in industrial automation. Explain the working of any two transfer devices with the help of neat sketches.
- (c) Explain what do you mean by robotics control system? Explain various types of robot control system.
- (d) Explain AC and DC servo motor along with its salient features and applications.
- (e) Justify how task level processing can solve the major disadvantages of language based programming. Discuss using a suitable illustration to support your answer.

SECTION C

3. Attempt any one part of the following: 10x1=10

- (a) Discuss in short about fluid power systems. Also write down the advantages and disadvantages of fluid power systems
- (b) Illustrate the different hierarchical levels in Industrial Automation

4. Attempt any one part of the following: 10x1=10

- (a) Explain the various characteristics of robotic sensing device. Make a broad classification of various kinds of sensors used in industrial robots.
- (b) Describe in detail the Industrial applications of vision controlled robotic systems.

5. Attempt any one part of the following: 10x1=10

- (a) Illustrate the forward kinematics of a 3 DOF industrial robot with rotational joints. Explain the functions of an inverse kinematics algorithm. Draw suitable diagram for your illustration. Mention the advantages of forward kinematics over inverse kinematics.
- (b) Examine and explain the following terms about a robot: accuracy, resolution, repeatability and speed of movement, load carrying capacity and reliability.

6. Attempt any one part of the following: 10x1=10

- (a) Examine various considerations for selection and design of a gripper. Explain working principle, salient features and applications of AC and DC servo motor as robot drive system.
- (b) Explain how you will determine the position and orientation of end effectors.

7. Attempt any one part of the following: 10x1=10

- (a) What do you mean by robot cell design? What are the considerations that must be kept in mind during designing a robot cell? Discuss in brief.
- (b) Give a list of factors that should be considered while evaluating a robot for welding capabilities. Give suitable explanations in support of your answer.