Printed Pages:02 **Sub Code: KOE-091**

Paper Id: 236030 **Roll No.** | | | | | | | | | | |

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. Given suitable explanations in support of your answer.