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**B.TECH**  
**(SEM VII) THEORY EXAMINATION 2021-22**  
**AUTOMATION & ROBOTICS**

**Time: 3 Hours****Total Marks: 70****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

- 1. Attempt *all* questions in brief. 2 x 7 = 14**
- a. What is fixed Automation?
  - b. Define Manufacturing Automation.
  - c. What is the use of buffer storage in automated flow line?
  - d. Write the differences between end effector tools & grippers.
  - e. What do you understand by Cogged Belt?
  - f. Explain the origin of the word “Robot”& what it means?
  - g. What is the function of placement device?

**SECTION B**

- 2. Attempt any *three* of the following: 7 x 3 = 21**
- a. What are the principles of Automation? Discuss each in detail.
  - b. What do you understand by transfer machine? What are its different types? Discuss any one in detail.
  - c. Discuss the advantages & disadvantages of using a robot. Also, write some important applications of industrial robots.
  - d. What are actuators? Briefly discuss its types.
  - e. What is robot programming? What are their types? Discuss any one type in detail.

**SECTION C**

- 3. Attempt any *one* part of the following: 7 x 1 = 7**
- (a) What are the basic components of hydraulic power system? Discuss in detail.
  - (b) What is feedback control system? Discuss its basic elements. Also mention its advantages & limitations.
- 4. Attempt any *one* part of the following: 7 x 1 = 7**
- (a) What is cycle time analysis? What are its benefits? Write steps for using it.
  - (b) What are the different types of production line? Explain any two in detail.
- 5. Attempt any *one* part of the following: 7 x 1 = 7**
- (a) Describe the anatomy of industrial robots.
  - (b) Derive the forward & inverse kinematic equation for 3 DOF manipulator for any arbitrary position.



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6. Attempt any *one* part of the following: 7 x 1 = 7

- (a) Explain the working of magnetic gripper. Also write its advantages & limitations.
- (b) What are the different mechanisms commonly used for rotary to linear motion conversion? Discuss any two in detail.

7. Attempt any *one* part of the following: 7 x 1 = 7

- (a) What are the different methods used for work part transport in “In Line” work cell. Discuss in detail.
- (b) A robot centered work cell has one robot servicing three machines. The cycle time of machines are given in table.

- i) Develop a robot-machine process chart
- ii) Prepare the process chart for at least 3 cycles.
- iii) Determine machine interference.
- iv) Determine the robot idle time.

Machine	Load	Run
1	20	20
2	10	20
3	5	20