**2025**

# Industrial Automation

*Full Marks: 100:*　Time: Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any\_\_\_05\_\_\_** questions out of 07.*

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|---|---|---|---|
| 01 | A | Write the full form of LASER, RTS,  JPG,PNG,MAC, TCP,EBCDIC, WWW, CTS, PID. | 10 |
| | B | What is mean by automation? Why automation is required for the industrial process? | 05 |
| | C | Draw and derive the expression of negative feedback. what are the advantages of negative feedback? | 05 |
| 02 | A | Define the Robotic arm terminology: Link, Joint, Degrees of freedom, Tool centre point, workspace. | 10 |
| | B | Write the major application areas of robotic system. | 05 |
| | C | Define forward and inverse kinematics with the help of an example. | 05 |
| 03 | A | What are the seven different layers of OSI model explain the working of each layer in short? | 10 |
| | B | Draw AND circuit, Draw Its relay circuit. Also draw its LADDER logic diagram. Finally draw PLC circuit. | 05 |
| | C | Draw the figure of Optocoupler. | 05 |
| 04 | A | Write a short note on:  (a) Field bus (b)Fibre optics, | 10 |
| | B | Draw 3-bit Flash type ADC. | 05 |
| | C | What is PID controller. Write down its equation. | 05 |
| 05 | A | Draw the block diagram of Successive approximation type ADC. Explain with | 10 |
| | B | Draw electromechanical relay with two connectors. | 05 |
| | C | Draw and label counter type ADC. | 05 |
| 06 | A | The links of a 3R robotic arm are $L_1$ = 100 mm, $L_2$ = 250 mm and $L_3$ = 50 mm. The gripper is at world coordinates given as x = 200 mm, y = 300 mm and α = 30˚. Determine the angles $\theta_1$, $\theta_2$ and $\theta_3$, which the motor controlling the shoulder, elbow and wrist to be rotated. | 10 |
| | B | What are the three Laws of Robotics? Mention the safety issues in robot usage. | 05 |
| | C | What are the different subsystems of a robotic system? Discuss them briefly. | 05 |
| 07 | A | Draw the block diagram of Digital data acquisition system and explain shortly about each block. | 10 |
| | B | What is Optocoupler? Why it is used in electronic circuits. | 05 |
| | C | Function of data link. | 05 |