

9091

21011

3 Hours / 80 Marks

Seat No.

--	--	--	--	--	--	--	--

- Instructions* – (1) All Questions are *compulsory*.
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.
(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

- 1. Answer any FOUR of the following :** **16**
- a) State the function of following units (elements) of distributed control system (TDC3000)
- (i) Analog unit
 - (ii) Controller file
 - (iii) Highway Traffic Detector (HTD)
 - (iv) Process interface unit
- b) List softwares used for programming following brands of PLC's
- (i) Allen-Bradley PLC (Micrologix series)
 - (ii) Siemens PLC (S7 series)
 - (iii) GE Fanuc PLC
 - (iv) MITSUBISHI Electric PLC (Alpha controller)

P.T.O.

- c) What is the controller output for a proportional plus derivative controller initially and 2 seconds after the error begins to change from the zero error at the rate of 1.2 %/s ? The controller has set point 50% and $K_P = 4$ and $K_D = 0.4$.
- d) State difference between PLC and PC (four points)
- e) Sketch potentiometer as a error detector. Define its sensitivity.
- f) What is a control valve ? List its elements.

2. Attempt any THREE of the following :

12

- a) Define following terms of control systems
 - (i) Error
 - (ii) Controller
 - (iii) Reference input
 - (iv) Disturbance
- b) Draw the circuit for electronic PID controller use (Op-Amplifiers)
- c) Explain in brief working of permanent magnet stepper motor.
- d) What is a reed relay ? Sketch lead compensating network.

3. Attempt any THREE of the following :

12

- a) Draw the diagram of flow control loop. State function of each element of it.
- b) State the difference between pneumatic and hydraulic system (four points)
- c) What is a tachogenerator ? List four advantages of DC tachogenerator.
- d) Sketch power control circuit for conveyor belt.

- 4. Attempt any TWO of the following : 16**
- a) With diagram explain working of flapper-nozzle amplifier. Draw its characteristics.
 - b) Explain with diagram working of DC position control system.
 - c) Draw the diagram of SCADA system. List the functions of elements of it.
- 5. Attempt any TWO of the following : 12**
- a) Explain with diagram operation of temperature switch.
 - b) What is a input module ? State the functions of elements of it. List four input modules.
 - c) Draw the ladder diagram to control the operation of stepper motor.
- 6. Attempt any TWO of the following : 12**
- a) Describe the procedure that could be used for tuning the controller.
 - b) Sketch synchro error detector. State electrical zero position of synchro control transformer.
 - c) What is solenoid ? State it's working principle. List its four applications.
-