Instructions –

(1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

1. **Attempt any FIVE of the following:**

   a) Explain concept of two wire control circuit.

   b) Describe control and power circuit for simple plugging of Induction motor with neat diagram.

   c) Describe block diagram of PLC power supply with neat diagram.

   d) Describe off delay timer instructions.

   e) State the principle of derivate control action. Write its standard equation.

   f) Describe inductive proximity switch with neat diagram.

   g) Describe standard start-stop-seal circuit with neat diagram.
2. **Attempt any FOUR of the following:**
   
a) Describe electromagnetic relay with neat diagram.

b) Describe the construction and working of AC servomotor.

c) Describe capacitive type proximity switches with neat diagram.

d) Describe control and power circuit for dynamic braking.

e) Describe on delay timer instruction.

f) Describe the principle of integral control action. Write its standard equation.

3. **Attempt any TWO of the following:**
   
a) Draw a ladder diagram for two motor system having following conditions:
   
(i) Starting push button starts motor 1

(ii) After 10 seconds, motor – 2 is ON

(iii) Stopping the switch stops motor 1 and 2
   
   (Time base = 1 sec)

b) Describe in detail the memory organisation list and explain types of memory.

c) Describe power and control circuit diagram of forward stop reverse type DOL starter with neat sketch.

4. **Attempt any FOUR of the following:**
   
a) Describe bimetallic thermal overload relay with neat sketch.

b) Describe power and control circuit diagram of current limit acceleration starter for slipring induction motor with neat diagram.

c) Describe classification of PLC I/O module.

d) Draw the ladder diagram to verify the truth table of:
   
(i) AND gate

(ii) OR gate

e) Describe control action of proportional - Integral controllers.

f) Describe control action of Integral controllers.
5. Attempt any FOUR of the following: 16
   a) Differentiate power and control wiring.
   b) Describe power and control action circuit diagram of definite
time limit starter for slipring induction motor with neat
diagram.
   c) List two advantages and two disadvantages of PLC.
   d) Draw ladder diagrams for following logic operations:
      (i) NOT
      (ii) Ex-OR
   e) Describe proportional - Integral derivative controllers.
   f) Explain the concept of NO and NC contact.

6. Attempt any TWO of the following: 16
   a) Draw block diagram of PLC and explain each block in detail.
   b) Describe power and control circuit diagram of forward and
random reversing type DOL starter with neat sketch.
   c) Draw a ladder diagram for a two motor system having
following conditions:
      (i) When start button is pushed, motor lamp 1 is ON.
      (ii) After 10 sec, lamp 2 is ON and lamp 1 turns OFF.
      (iii) After step 2, lamp 2 turns OFF after 5 sec and lamp 1
turns ON.
      (iv) When stop button is pressed, both the lamps turn OFF.