Scheme - I

Sample Question Paper

Program Name : **Electronics Engineering Programme Group**

Program Code : **DE/EJ/ET/EN/EX/EQ/IS/IC**

22534

Semester : **Fifth**

Course Title : **Industrial Automation (Elective for DE/EJ/ET/EN/EX/EQ)**

Marks : **70** **Time: 3 Hrs.**

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) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following. **10 Marks**

a) State the benefit of Automation.

b) Compare Fixed and Modular PLC. (any two points)

c) State the I/O Module selection criteria wrt PLC.

d) List different programming languages used with PLC.

e) Give list of any four relay type instructions with their symbols.

f) List the functions of Electrical drives.

g) List different editors used in SCADA.

Q.2) Attempt any THREE of the following. **12 Marks**

a) Compare fixed and flexible automation on any four points.

b) With neat sketch explain redundancy in PLC.

c) Draw a neat block diagram of PLC and describe the working of its parts.

d) List different PLC programming languages. Explain any one with suitable example.

Q.3) Attempt any THREE of the following. **12 Marks**

a) List any four device & four output devices that can be connected to PLC.

b) Draw a generalized block diagram of Electrical Drives and explain in brief.

c) Compare PLC and SCADA system on any four points.

d) Write a PLC ladder program for 24-hour time clock.

Q.4) Attempt any THREE of the following. 12 Marks

a) Draw block diagram of SCADA system and explain its parts.

b) Explain the sinking & sourcing concept in PLC input output module.

c) Describe the working of UP counter with neat diagram and waveform.

d) Compare AC and DC drives on any four points.

e) Draw a symbol of ON delay timer instruction. State the function of following :

i) Enable bit (EN) ii) Done bit (DN) iii) Timer timing bit (TT)

Q.5) Attempt any TWO of the following. 12 Marks

a) Select device that can be used with PLC to control the speed of AC motor. Explain how?

b) Develop a ladder program for Traffic light control system with following conditions:

i) Red light ON for 30 sec, ii) green light ON for 25 sec, and

iii) Yellow light on for 05 sec. iv) Repeat the sequence until stop push button is pressed.

c) Draw a neat wiring diagram (interfacing diagram) of following I/O devices with appropriate PLC module: i) Proximity sensor – 24VDC, ii) Limit switch, iii) Lamp - 24VDC, iv) Fan – 230VAC.

Q.6) Attempt any TWO of the following. 12 Marks

a) Describe the steps involve developing SCADA application for following system.

b) There are four outputs A, B, C, D. Draw the ladder diagram for following condition:

i) A goes off when stop switch is pressed. ii) B goes off 7 seconds after A.

iii) C goes off 6 seconds after B. iv) D goes off 2 seconds after C.

c) Draw Ladder diagram for automatic bottle filling system. Assume suitable system design for the same.

Scheme - I

Sample Test Paper - I

Program Name : **Electronics Engineering Programme Group**

Program Code : **DE/EJ/ET/EN/EX/EQ/IS/IC**

22534

Semester : **Fifth**

Course Title : **Industrial Automation (Elective for DE/EJ/ET/EN/EX/EQ)**

Marks : **20** **Time: 1 Hour**

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) Preferably, write the answers in sequential order.

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Q.1 Attempt any FOUR. **08 Marks**

a) Define Automation.

b) List different systems used in Industrial Automation.

c) Draw block diagram of Power supply used in PLC.

d) List different speciality I/O module.

e) Give addressing format for me I/P and O/P in PLC.

f) List any four comparison instructions.

Q.2 Attempt any THREE. **12 Marks**

a) Draw automation hierarchy and explain.

b) Write functions of following parts of PLC.

c) Give I/O selection criteria for PLC.

d) Write a ladder diagram for traffic light control with following conditions: i) Red light – 25sec, ii) Green light – 20 sec, iii) Yellow light – 5 sec, iv) Repeat the sequence.

e) List different PLC programming languages. Explain any one with example.

Scheme - I

Sample Test Paper - II

Program Name : **Electronics Engineering Programme Group**

Program Code : **DE/EJ/ET/EN/EX/EQ/IS/IC**

22534

Semester : **Fifth**

Course Title : **Industrial Automation (Elective for DE/EJ/ET/EN/EX/EQ)**

Marks : **20** **Time: 1 Hour**

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) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

a) List types of Electric drives.

b) Define wrt to SCADA: i) Tags, ii) Items.

c) List various elements of SCADA system.

d) Elaborate the term “an OPC”

e) Draw format of following instructions wrt to PLC:

i) Down Counter, ii) ON Delay timer

f) State the function Variable frequency drives.

Q.2 Attempt any THREE. **12 Marks**

a) Draw functional block diagram of Electrical drives and explain in brief.

b) Draw basic architecture of SCADA and explain in brief.

c) List different editors in SCADA (any four) and describe the functions of each.

d) Write a PLC ladder diagram for following motor sequence:

i) Start button starts motor M1.

ii) After 10 sec M1 is off and M2 is ON.

iii) After 5 sec motor M2 is off.

iv) Stop push button stops M1, M2, if pressed any time during process.

e) Enlist different specifications of AC drives. (Any eight)

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12223

3 Hours / 70 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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) State the need of automation.

(b) List the different types of PLC.

(c) State the redundancy in PLC.

(d) Write any four name of PLC programming languages.

(e) State PLC I/o addressing.

(f) State the characteristics of electric drives.

(g) State the benefits of SCADA.

2. Attempt any THREE of the following : **12**

(a) Explain various types of automation system.

(b) Explain with a neat block diagram the working principle of PLC.

(c) Explain memory organization of PLC with diagram.

(d) Explain Time on delay instruction with symbol & waveform.

3. Attempt any THREE of the following : **12**

(a) Give the names of any four analog input and analog output devices.

(b) Explain with neat block diagram, the function of each block of electrical drives.

(c) State different tools of automation system. Explain any one in brief.

(d) Explain any two data handling instruction with symbol.

4. Attempt any THREE of the following : **12**

(a) Explain with neat block diagram of SCADA.

(b) Explain significance of OPC in SCADA based application.

(c) Explain any four special I/o modules of PLC.

(d) Compare AC and DC drives on any four points.

(e) Compare PLC and SCADA system. (four point)

5. Attempt any TWO of the following : **12**

(a) Describe the speed control of AC motor using VFD (Variable Frequency Drive)

(b) Develop ladder program for following :

(i) $Q = A + \overline{B} + C\overline{D}$

(ii) Ex-NOR logic gate

(iii) NOT logic gate

(c) Sketch the interfacing diagram (wiring diagram) for following I/o devices with appropriate PLC module :

(i) Proximity sensor – 24 V DC

(ii) Limit switch

(iii) Level switch

(iv) Lamp – 24 V DC

(v) Fan – 230 V AC

(vi) Heater – 230 V AC

6. Attempt any TWO of the following : **12**

(a) Describe the steps to develop SCADA application for traffic light control.

(b) Develop ladder program for following conveyor system :

(i) When start push button is pressed, the conveyor A and B carrying objects starts after 10 seconds.

(ii) Conveyor A and B stops when total object count equals to 50 number.

(iii) Use suitable sensors to detect object over conveyor A and B.

(c) Develop ladder program for following Boolean expression :

$AB + \overline{C}D + E = Y_1$

$FGH + I\overline{J} = Y_2$

$Y_1 + Y_2 = Q$

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21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

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

Marks

1. Attempt any FIVE : **10**

(a) State the need of automation.

(b) List different types of PLC.

(c) Name any four special I/O modules of PLC.

(d) Draw PLC I/O addressing format.

(e) List any four PLC programming languages.

(f) List types of electrical motor drives.

(g) List various editors of SCADA.

2. Attempt any THREE : **12**

(a) List types of automation system. Explain each in brief.

(b) Differentiate fixed and modular PLC on any four point.

(c) Draw a block diagram of Discrete AC input module of PLC. Explain each block in brief.

(d) Draw a symbol of on-delay timer instruction. Explain its operation with neat waveform.

3. Attempt any THREE : **12**

(a) Draw a neat wiring (Interfacing) diagram of following I/O devices with appropriate PLC module :

(i) Push button – 24 VDC

(ii) Hooter – 230 VAC

(iii) Motor – 230 VAC

(iv) Level Switch – 24 VDC

(b) Draw generalized block diagram of electric drive. Explain each block in brief.

(c) State different tools of industrial automation. Explain any one in brief.

(d) Draw ladder diagram symbol with proper addressing for following instructions :

(i) Limit Test

(ii) Retentive timer

4. Attempt any THREE : **12**

(a) Draw typical architecture of SCADA. Explain its part.

(b) Explain the interfacing of PLC based application to SCADA.

(c) Draw memory organization of PLC. Explain function of any two element of organization.

(d) Differentiate AC and DC drives on any four point.

(e) List down various steps to develop SCADA application of traffic light control.

5. Attempt any TWO : **12**

(a) List any six factors influencing on selection of electrical drives.

(b) Draw a ladder diagram for stepper motor control.

(c) Segregate following Input Output devices into discrete input device, discrete output device, analog input device, and analog output device :

(i) Limit switch

(ii) Control valve

(iii) Pressure transmitter

(iv) Proximity switch

(v) Hooter

(vi) Red Lamp

6. Attempt any TWO : **12**

(a) Draw SCADA screen of water distribution application. List various dynamic animation linkage.

(b) Two pulser start at the same time. Pulse output J is pulse for 2 second at every 12 seconds. Pulse output K is to pulse for 2 second at every 4 seconds. Write a ladder logic for above.

(c) Draw the ladder diagram for following Boolean Expression :

$AB + \overline{C}D + E = Y_1$

$FGH + I\overline{J} = Y_2$

$Y_1 + Y_2 = Q$

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11920

3 Hours / 70 Marks Seat No. | | | | | | | | |

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.

Marks

1. Attempt any FIVE of the following : **10**

(a) State the need of Automation.

(b) Draw a neat block diagram of PLC power supply.

(c) State the I/O module selection criteria with respect to PLC.

(d) List the types of comparison instruction used in PLC.

(e) Give any two relay type instructions with their symbols.

(f) State the need of electric drives.

(g) List any four applications of SCADA.

2. Attempt any THREE of the following : **12**

(a) Compare fixed and programmable automation on any four points.

(b) Explain redundancy in PLC with suitable diagram.

(c) Draw a neat block diagram of PLC and explain the function of CPU and memory.

(d) Draw a symbol of OFF delay timer instruction. State the function of following :

(i) Enable bit

(ii) Done bit

(iii) Timer timing bit

3. Attempt any THREE of the following : **12**

(a) State the function of each block of analog output module with block diagram.

(b) Draw a basic block diagram of electrical drive and explain each block in brief.

(c) Compare PLC and SCADA on any four points.

(d) Explain any four data handling instruction used in PLC.

4. Attempt any THREE of the following : **12**

(a) Draw block diagram of SCADA system and explain its parts.

(b) Describe the steps involved in interfacing of PLC based application to a SCADA system.

(c) Describe memory organisation of PLC with neat sketch.

(d) Explain (V/f) control method of AC drive with suitable diagram.

(e) Explain how SCADA is used in water distribution system with diagram.

5. Attempt any TWO of the following : **12**

(a) Select device that can be used with PLC to control the speed of DC motor. Explain how.

(b) Draw ladder diagram for stepper motor control in clockwise direction.

(c) Explain special I/O modules used in PLC.

6. Attempt any TWO of the following : **12**

(a) Describe the steps involve developing SCADA application with an simple system.

(b) State the types of programming languages and explain any two.

(c) Draw a ladder diagram for a two motor system having following condition :

(i) Start push button, starts motor M1.

(ii) After 10 sec, motor M1 is OFF and motor M2 is ON.

(iii) After 5 sec motor M2 is OFF.

(iv) STOP push button, stop both motors M1 and M2 if pressed any time during process.
