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**Question Paper Code: 49305**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Sixth Semester

Electrical and Electronics Engineering

14UEE905 – PROGRAMMABLE LOGIC CONTROLLER AND SCADA

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(Smith chart may be permitted)

PART A - (10 x 1 = 10 Marks)

- PLCs are \_\_\_\_\_ designed for use in the control of a wide variety of manufacturing machines and systems.
  - Special-purpose industrial computers
  - Personal computers
  - Electromechanical systems
  - All the above
- In a current sinking DC input module, \_\_\_\_\_.
  - The current flows out of the input field device
  - Requires that a AC sources be used with mechanical switches
  - The current flows out of the input module
  - Currents can flow in either direction at the input module
- To protect a PLC from any incoming surges from field, Isolated devices such as \_\_\_\_\_ is used.
  - Transformer
  - ADC
  - DAC
  - Transducer

4. Which of the following Relay Ladder Logic (RLL) applications is not normally performed in early automation systems?
- (a) On/off control of field devices
  - (b) Logical control of discrete devices
  - (c) On/off control of motor starters
  - (d) Proportional control of field devices
5. A SCADA system performs Data acquisition, Networked data communication, \_\_\_\_\_ and control.
- (a) Data representation
  - (b) Microcontroller
  - (c) Distributed control system
  - (d) None of these
6. Components of a modern SCADA system are
- (a) Field devices
  - (b) Controllers, Remote I/O's and Distributed I/O's
  - (c) Human Machine Interface (HMI), SCADA Servers/Clients
  - (d) All above
7. Why does SCADA software can communicate with many kinds of PLC's?
- (a) SCADA software flexibility contents many device drivers
  - (b) SCADA software fixes many device drivers
  - (c) SCADA software supports popular PLC drivers
  - (d) SCADA software supports popular field devices
8. A \_\_\_\_\_ consists of number of mini computers or microcomputers interconnected in a tree structure.
- (a) Shared bus system
  - (b) Ring system
  - (c) Hierarchical system
  - (d) None of these
9. PLC can be \_\_\_\_\_ in plant to change the sequence of operation.
- (a) only programmed
  - (b) only reprogrammed
  - (c) programmed and reprogrammed
  - (d) able to give a set point
10. The PLC is used in
- (a) machine tools
  - (b) automated assembly equipment
  - (c) moulding and extrusion machines
  - (d) all the above

PART - B (5 x 2 = 10 Marks)

11. How the PLC is applied in automation? Enumerate two advantages of PLC.
12. Enumerate the factors to be considered on a PLC system after installation based on operating environment. Also mention some basic electrical problems in PLC.
13. Define SCADA and mention the most important objectives of SCADA.
14. State the various operating states of a power system with diagram.
15. Write some areas of application of SCADA in power systems.

PART - C (5 x 16 = 80 Marks)

16. (a) What is PLC? Explain about the components of PLC. (16)

Or

- (b) Describe the contact (input) functions and coil (output) function of the PLC. Create basic ladder diagrams from a sequence of operational steps. Also list the major steps in creating a PLC program for an industrial situation and discuss the content of each of these steps with the help of flowchart. (16)

17. (a) Explain the operation of basic two axis robot with PLC sequencer control. (16)

Or

- (b) (i) Discuss and demonstrate how the PLC handles overflow and negative numbers for the ADD and SUBTRACT functions. Also list and define the six basic COMPARE functions. (8)

- (ii) Describe the operation of the SKIP and MASTER CONTROL RELAY functions. Apply the SK and MCR functions to operational applications. (8)

18. (a) Write a brief description about SCADA systems. (16)

Or

(b) With a neat block diagram, discuss the following as applied to Remote Terminal Unit: (16)

(i) Communication interface

(ii) Data Processing Master Stations

19. (a) (i) Explain why communication equipment's are important in Distribution Automation system using IEC 61850 and draw the simplest SCADA configuration employing a single computer. (6)

(ii) Discuss the various Automatic substation control functions arranged through SCADA systems. Enumerate the different control centre involved in Energy Management System for a large inter-connected system and discuss the typical objectives of system control centre step by step. (10)

Or

(b) Draw the power system state transition diagram and discuss the various operating states of the power system in detail to make the system secure. (16)

20. (a) With a neat operator station for a variable speed drive and connection diagram from PLC to VS drive terminal block, discuss the PLC application for speed control of AC motors with variable speed (VS) drives. (16)

Or

(b) Explain the SCADA applications in transmission and distribution sector operations. (16)

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