A Reg. No. : | | | | | | | | | | |

Question Paper Code: 57502

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Seventh Semester

Electronics and Instrumentation Engineering

15UEI702 -PLC and SCADA

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The process of converting a discrete time continuous value signal into discrete time discrete value signal is CO1-R

   (a) Sampling (b) Coding (c) Quantisation (d) ADC

2. Velocity form of digital controllers causes Controller drift when _____ control action is absent CO1-R

   (a) P (b) I (c) PI (d) D

3. The PLCs were originally designed to replace CO2-R

   (a) Analog controllers (b) Microcontrollers

   (c) Computers (d) Hardwired Relays

4. In a current sinking DC input module _____. CO2-R

   (a) The current flows out of the input field device

   (b) Requires that a AC sources be used with mechanical switches

   (c) The current flows out of the input module

   (d) Currents can flow in either direction at the input module

5. The SKIP instruction in PLC CO3- R

   (a) Allows a portion of the program to be bypassed when its coil is de-energised

   (b) Allows a portion of the program to be bypassed when its coil is enabled

   (c) Skips the portion of the output coils

   (d) Skip that particular Rung

6. _____ instruction is used as a program control function. CO3- R

(a) MCR (b) RESET (c) TIMER (d) CNTL

7. _____ motor is most suitable for precision motion control. CO4 -R

(a) Induction Motor (b) Synchronous Motor (c) Stepper Motor (d) Servo Motor

8. To identify non-metal objects in a conveyor _____ sensor is most preferable. CO4 -R

(a) Capacitive Proximity (b) Inductive Proximity

(c) IR (d) Ultrasonic

9. Line Modems used to connect RTU to a network uses _____ technique to establish communication. CO5- R

(a) Phase Shift Keying (b) Time Shift Keying

(c) Frequency Shift Keying (d) Coded Shift Keying

10. IEC60870 is an CO5- R

(a) Open SCADA Protocol (b) Serial Cable

(c) Closed SCADA Protocol (d) Parallel Cable

PART – B (5 x 2= 10Marks)

11. Determine the Z-transform for e^{-at} CO1 -R

12. Differentiate modular PLC and fixed PLC. CO2-U

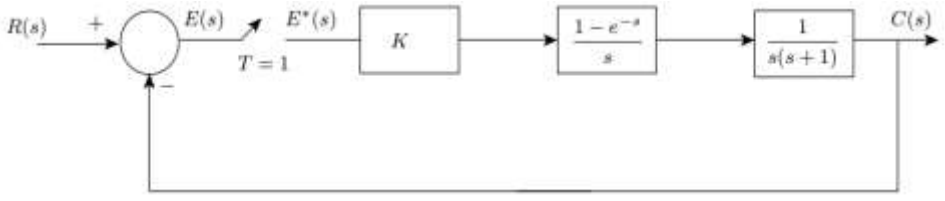
13. State the use of sequencer instructions in PLC. CO3-U

14. List the possible inputs and outputs in elevator. CO4-R

15. How do you communicate SCADA with PLC? CO5-U

PART – C (5 x 16= 80Marks)

16. (a) (i) Determine the closed loop stability of the system shown in Figure when K = 1 and also find out the range of K for which the system is stable. CO1-App (12)



(ii) Comment stability for the following characteristic equation: CO1-App (4)
$P(z) = z^3 + 0.25z^2 + z + 0.25 = 0$.

Or

(b) Derive and explain the position and velocity form of digital control algorithm. CO1-App (16)

17. (a) Draw the architecture of PLC and explain its functional blocks and also state the advantages of PLC. CO2 -U (16)

Or

(b) (i) Explain the various timer logics in PLC. CO2 -U (10)

(ii) Develop a ladder program to control traffic light in one direction. CO2-Ana (6)

18. (a) List and discuss various arithmetic instructions in PLC. CO3 -U (16)

Or

(b) (i) List the various compare instructions in PLC and discuss any 3 compare instructions in detail. CO3 -U (10)

(ii) Develop a ON/OFF control based ladder logic program to maintain the temperature of a tank within 1% deviation between setpoint. CO3-Ana (6)

19. (a) With suitable diagram explain the construction and operation of reactor and also write a PLC program to monitor and control the reactor. CO4-U (16)

Or

(b) With suitable diagram explain the construction and operation of LPG filling system and also write a PLC program to monitor and control the reactor. CO4 -App (16)

20. (a) Draw the architecture of SCADA. Explain various functions carried out by SCADA. CO5- U (16)

Or

(b) Explain in detail about DNP3 SCADA communication protocol. CO5-U (16)

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