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Question Paper Code: BPE203



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech I Semester End Examinations (Regular) - February, 2017

Regulation: IARE-R16

PROGRAMMABLE LOGIC CONTROLLERS AND THEIR APPLICATIONS

(Power Electronics and Electrical Drives)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

- Describe some of the main features of programmable controller. [6M]
 - Describe some of the benefits on using programmable controller. [8M]
- Illustrate a typical ASCII transmission by transmitting character Z. [6M]
 - Explain components of a modularized PLC. [8M]

UNIT – II

- Examine the principles of programming adopted while using Ladder Diagrams (LD) to control programmable logic controllers. [6M]
 - Explain the operation of the following input devices, stating the form of the signal being sensed and the output [8M]
 - reed switch
 - incremental shaft encoder
 - photoelectric transmissive switch
 - diaphragm pressure switch
- Briefly explain the architecture of a programmable logic controller. [6M]
 - Determine the memory requirements for an application with the following specifications: [8M]
 - 70 outputs, with each output driven by logic composed of 10 contact elements
 - 11 timers and 3 counters, each having 8 and 5 elements, respectively
 - 20 instructions that include addition, subtraction and comparison, each driven by 5 contact elementsTable given below provides information about the applications memory utilization requirements

Instruction	Words of memory required
Examine ON or OFF (contacts)	1
Output coil	1
Add/subtract/compare	1
Timer/counter	3

UNIT – III

5. (a) Draw the ladder diagram for a T flip flop CR1 which will toggle only when IN1 and IN2 are both off. [7M]
- (b) Explain branching and convergence in sequential function chart with an example. [7M]
6. (a) Write a sequential function chart program for traffic lamp sequence controller controlling green and red light. [6M]
- (b) Draw the ladder rungs represented by the boolean equations [8M]
- $Q = (A.B + C) . \bar{D}.E.\bar{F}$
 - $Q = A + \bar{B}$
 - $Q = \bar{A}.B. \bar{C} + D$
 - $Q = A.B + C.D$

UNIT – IV

7. (a) List the various steps in commissioning programmable logic controller based system. [7M]
- (b) Explain the specifications of IEC 1131 standard. [7M]
8. (a) Explain in detail about documentation of a PLC system. [7M]
- (b) Explain hardware and software to implement a water level controller with pump motor control using four switches. [7M]

UNIT – V

9. (a) Explain how ladder diagram is created from process control descriptions. [7M]
- (b) Demonstrate with an example, the hardware and software design to implement any application of your own. [7M]
10. (a) Explain PLC applications in detail. [7M]
- (b) Specify how rotor-resistance cutting method of starting induction motor is implemented using programmable logic controller. [7M]