Ref. No.: Ex/PG/ETCE/T/112C/2018

M. E. (ELECTRONICS & TELE-COMM. ENGG.) EXAM., 2018
(First Year, 1st Semester Examinations, 2018)

PROGRAMMABLE LOGIC CONTROLLERS

Time: Three Hours Full Marks: 100

Answer any **Five Questions.**
(All Parts of a question must be answered at one place only)

1. (a) Give the technical definition of a PLC as defined by NEMA. [3]
   (b) List and explain the major characteristics functions of a PLC that provides lot of advantages in an industrial environment. [4]
   (c) Draw the simplified block diagram of a PLC and explain in detail the three basic sections. [13]

2. (a) Name the basic program format for a PLC and list the basic rules associated with it. [4]
   (b) Implement the truth table of the Half Adder Logic using the basic PLC Program format . [8]
   (c) Implement the basic PLC Program format / diagram to fulfill the following conditions: [8]
   When the start switch is ON, the motor is ON
   When the stop switch is ON, the motor is OFF
   When the motor is ON, the green light is ON
   When the motor is OFF, the red light is ON

3. (a) Show the schematic diagram of a Functional block of a PLC Timer and explain the functions in a Timer. Differentiate Retentive and Non-retentive Timer. [8]
   (b) Draw a basic PLC Program format / diagram for a two motor system having the following conditions: [8]
   The start switch starts motors 1 and 2. The stop switch stops motor 1 first, and after 15 seconds, motor 2 stops.

Input	Output
Start = I:0/1	M1 = O:0/1
Stop = I:0/2	M2 = O:0/2

   (c) Differentiate between the PLC Timer and Counter operations [4]

4. (a) List the major characteristics of a Programmable Automation Controller(PAC)
   (b) Explain the operation of an Industrial PAC with the help of the relevant (i) Starting Sequence (ii) Start-up process. Based on this, develop the basic PLC Program format / diagram. [5+15]

5. (a) Differentiate PLC and Microcontroller Unit (MCU) in terms of their application area. [3]
   (b) List the architectural characteristics features of MCS-51 MCU family. [4]
   (c) (i) Explain the reason behind the logical separation of Data Memory (DM) and Program Memory (PM). (ii) Show the memory map of 8051 MCU PM and DM. (iii) Show the schematic of interfacing PM with 8051 MCU with appropriate Bus control signals and explain the same. Also show the corresponding Timing Diagram. [3+3+7]

6. (a) Draw the simplified structure of the single I/O Port pin of 8051 MCU and explain. [10]
   (b) Explain the following addressing modes of 8051 MCU with examples: (i) Indexed (ii) Relative. (iii) Explain the addressing mode that is unique to MCU. [3+4+3]

7. (a) Write an 8051 MCU Assembly Language Program (ALP) to perform the Block Transfer of Data in the external memory; ie from one block to another block within the same external memory.
   (b) Write an 8051 MCU ALP to Implement bit-wise XOR logic. [14+6]