CBCS SCHEME

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20MCM/MAR22

Second Semester M.Tech. Degree Examination, July/August 2022
Programmable Logic Controller

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. What is PCL? List its advantages and disadvantages. **(10 Marks)**

b. Describe how Executive Software controls the functionality of a PLC with a flow-chart. **(10 Marks)**

OR

2 a. With a block diagram, explain functioning of a PLC. **(10 Marks)**

b. Explain the operation of PLC – CPU with a neat block diagram. **(10 Marks)**

Module-2

3 a. Demonstrate DeMorgan's theorem using equivalent ladder diagram. **(10 Marks)**

b. The level control system of a water tank has two level switches L_{S_1} and L_{S_2} and as shown in Fig.Q3(b) below, such that when the water level > L_1 (value of lower limiting level), Ls_1 is 'ON' i.e. the output of Ls_1 = 1 and when the water level > L_2 = (value of upper limiting level) L_{S_2} is ON i.e, the output of L_{S_2} =1. Design a ladder diagram to achieve the following objectives.

i) When the water level < L_1 turn the pump 'ON'

ii) When the water level > L_2 turn the pump 'OFF'.

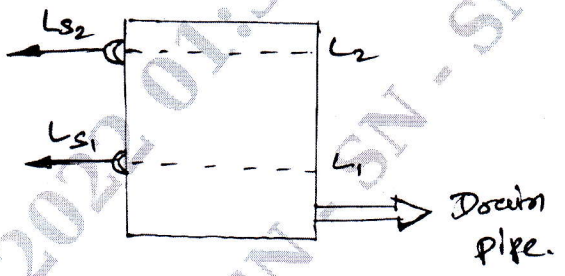

Fig.Q3(b) **(10 Marks)**

OR

4 a. Develop equivalent ladder diagram for 'XOR' and 'NAND' gate. **(10 Marks)**

b. Classify PLC Timers and Explain Timer on Delay and Timer OFF – Delay. **(10 Marks)**

Module-3

5 a. Explain Count Up (CTU) and Count Down (CTD). **(10 Marks)**

b. Enumerate the comparison between various instructions. **(10 Marks)**

OR

6 a. Explain the main features of logical instructions. **(10 Marks)**

b. Motor 1 (M1) starts as soon as the PLC starts. After 10 seconds, motor 1 goes off and motor 2 starts. After 5 seconds, M2 goes off and M3 starts. After another 10 seconds, M2 restarts and after 5 seconds it stops and M1 starts and the cycle is repeated. Prepare the logic diagram for the process. **(10 Marks)**

Module-4

7 a. Explain main features of Mathematical Instructions. **(10 Marks)**

b. Load shelding is an important concept in industry. Design a control for a Motor Generator (MG) set that conforms to the following specifications.

i) Start the MG and connect load1, load 2 and load 3 at intervals of 10 seconds

ii) If the MG current exceeds 750 amps shed load 3. If after 10 seconds, the load still exceeds 750 amps shed load 2. Repeat the above for load 1

iii) No load is to be picked up gain unless the current drops below 700 amps in which case all the loads will be picked up at intervals of 10 seconds. The cycle repeats itself. **(10 Marks)**

OR

8 a. Explain main features of special mathematical instructions **(10 Marks)**

b. Explain sinking and sourcing and also why they required. **(10 Marks)**

Module-5

9 a. Explain Handshaking process with a flowchart. **(10 Marks)**

b. Enumerate the comparison between Synchronous And Asynchronous Transmission. **(10 Marks)**

OR

10 a. List the advantages and disadvantages of Bus Topology. **(10 Marks)**

b. Explain the characteristics of CAN protocol. **(10 Marks)**

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