GANPAT UNIVERSITY

B.TECH SEM. VII - MECHATRONICS ENGINEERING
REGULAR EXAMINATION NOV/DEC - 2013
2MC701 ADVANCE CONTROLLER

Time: 3 Hours   Total Marks: 70

Instructions:

1). All questions are **compulsory**.

2). Figures to the **right** indicate full marks.

3). Answers to the two sections must be written in **separate** answer books.

4). Assume all necessary data.

Section – I

Que:-1

(A) Discuss the bits which are associated with the TON and TOF timer instructions of Allen Bradley's PLC. [06]

(B) Convert the below circuit into the Boolean equation, simply it and draw the ladder diagram for the simplified equation. [05]
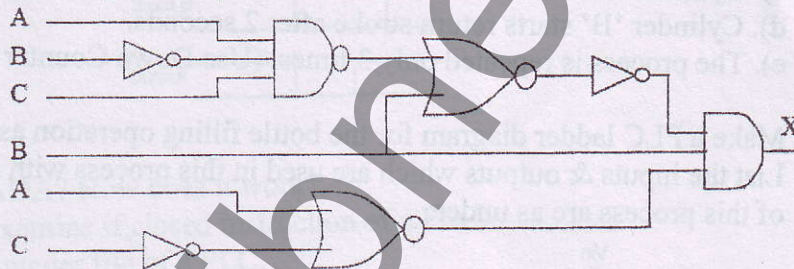
OR

Que:-1

(A) Draw the timing diagram of the outputs which are shown in the below figure for the given input condition. [05]
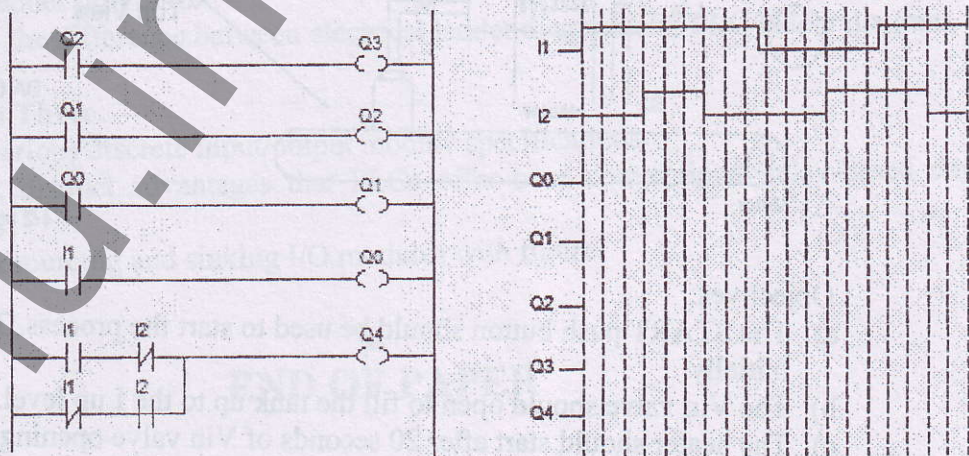
(B) List the different programming languages for the PLC. Explain the sequential function chart (SFC) method. [04]

(C) If starting source 16-bit word is: 1011 1110 1100 0011   [02]

The bits be allowed to pass : bits 4, 5 & 7 of the lower byte and bits 2, 3 & 5 of the upper byte.

Beginning destination 16-bit word is: 1100 1000 0110 0101

Then what will the mask be?

Que:-2   (A)   Explain the masked move (MVM) instruction.   [06]

        (B)   Make a PLC ladder diagram for the given objectives: [06]

a). GR_PB is used to turn on the green light.

b). After 5 seconds, the green light turns off and the red light turns on.

c). After 3.75 seconds, the red light turns off and the green light turns on again.

d). Repeat this process for 5 times. (Use Down Counter Only).

OR

Que:-2   (A)   Explain different processor modes of a PLC.   [06]

        (B)   Make a PLC ladder diagram to operate two SA cylinders by using 3/2 single solenoid   [06] DCVs. The objectives are as under:

a). When START PB is pressed, cylinder 'A' starts forward stroke.

b). Cylinder 'B' starts forward stroke after 5 seconds.

c). Cylinder 'A' starts return stroke.

d). Cylinder 'B' starts return stroke after 2 seconds.

e). The process is repeated only 3 times. (Use Down Counter only)

Que:-3   [12]

Make a PLC ladder diagram for the bottle filling operation as shown in below figure. List the inputs & outputs which are used in this process with addresses. The objectives of this process are as under:
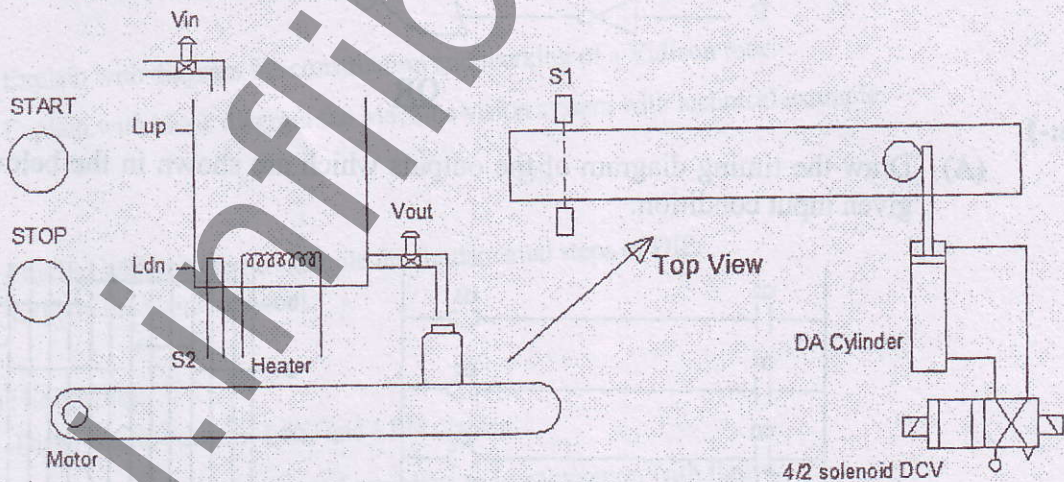
Objectives:

a) The START push button should be used to start the process. The tank is empty initially.

b) The Vin valve should open to fill the tank up to the Lup level.

c) The heater should start after 20 seconds of Vin valve opening and the heater should stop when the temperature of the liquid reaches to 50° C. The sensor S2 is used to sense the temperature of the liquid.

d) The Vin valve should close when the liquid level reaches to the Lup and the motor should start to run the conveyor.

e) When sensor S1 senses a bottle and that bottle reaches exactly below the Vout valve, the DA cylinder should extend to stop the bottle and the Motor must be stopped at this time.

f) The Vout valve should open for 50 seconds to fill the bottle.

g) After filling the bottle, the cylinder should retract and the motor starts to move the bottle.

h) Repeat the steps (e) to (g) for 50 bottles.

i) The STOP push button should be used to stop the process at any time.

Section – II

Que:-4
(A) Differentiate the types of processes and types of controls. [06]
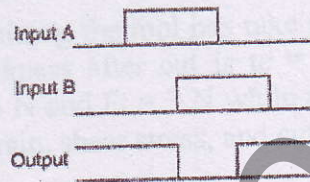(B) Draw and explain the discrete AC input module. [06]

OR

Que:-4
(A) Define maximum off-state current of an input module. Explain different methods to eliminate the problem of leakage current. [05]
(B) Draw and differentiate between three types of switching elements. [05]
(C) Draw the equivalent PLC ladder diagram for the given figure below. [02]

Que:-5
(A) What is SCADA? How does it work? [04]
(B) Explain an examine if closed instruction of a PLC. [04]
(C) Discuss the integer file of a PLC. [03]

OR

Que:-5
(A) Discuss the latch and unlatch concept with example. [04]
(B) Which instruction is used to convert the data from integer to BCD format? Explain with a ladder program. [04]
(C) Explain the difference between electrical ladder diagram and PLC ladder diagram. [03]

Que:-6 Attempt Any Three. [12]
(A) Enlist various discrete input/output module specifications.
(B) List six distinct advantages that PLCs offer over conventional relay-based control systems
(C) Explain sourcing and sinking I/O modules with figure.

END OF PAPER