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Date: 02/12/2014.

Student Exam No: \_\_\_\_\_

**GANPAT UNIVERSITY**  
**B.TECH SEM. VII - MECHATRONICS ENGINEERING**  
**CBCS REGULAR EXAMINATION NOV/DEC - 2014**  
**2MC701 - ADVANCE CONTROLLER**

**Total Marks: 70**

**Time: 3 Hours**

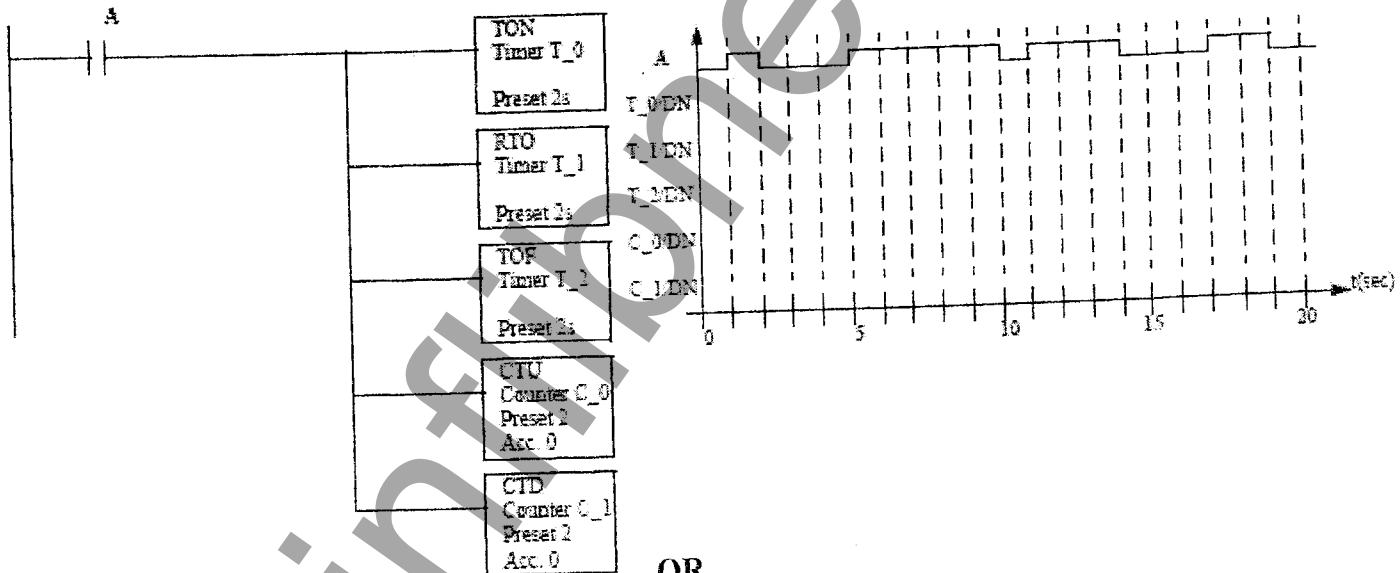
**Instructions:**

- 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.
- 5). Consider **Allen Bradley PLC** instructions only.

**Section - I**

**Que:-1**

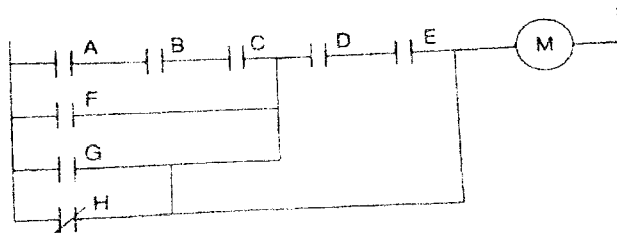
- (A) What is bidirectional counter? Explain with an example. [06]
- (B) Draw the timer and counter done bits for the ladder logic below. Assume that the accumulator of all the timers and counters are begin with 0. [05]



**OR**

**Que:-1**

- (A) Explain EN, TT and DN bits of the off-delay timer. [06]
- (B) Convert the given PLC ladder diagram to gate diagram and Boolean algebra expression. [05]



Que:-2

- (A) Describe the UP Counter instruction.
- (B) Make a PLC ladder diagram for the given objectives:
- A green pushbutton is used to turn on a green led 1 after 2 seconds.
  - After 3 seconds, the green led 1 is turned off & the green led 2 will be on.
  - After 1.25 seconds, the green led 2 is turned off & the green led 1 will be on again.
  - Repeat this process for 10 times. (Use UP Counter Only).
  - A red push button is used to stop the process at any time.

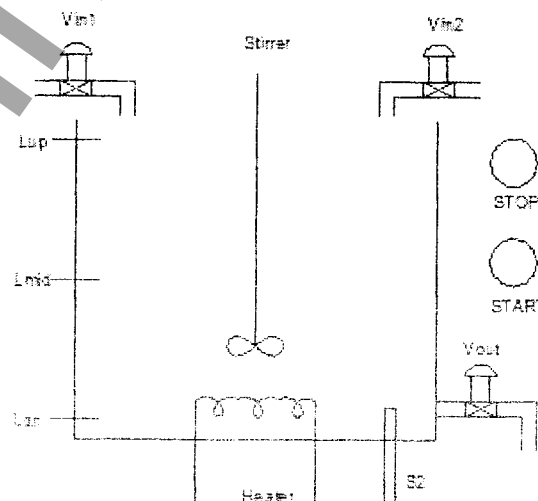
OR

Que:-2

- (A) Explain the MOVE instruction. What is difference between Move and copy instruction? [06]
- (B) Make a PLC ladder diagram for the following application. [06]
- “ Two SA cylinders ‘A’ & ‘B’ are at retract position in the initial position. When I press a START push button, the cylinders A & B start forward stroke simultaneously. After 10 seconds, the cylinder ‘A’ completes return stroke. Then the cylinder ‘B’ completes return stroke. Again the cylinders A & B start forward stroke and repeat the process. The STOP push button is used to stop the process at the initial position. Assume both cylinders are operated by single solenoid 3/2 direction control valves.

Que:-3 Attempt all.

- (A) What is difference between PLC ladder diagram and electrical ladder diagram? [02]
- (B) Make a PLC ladder diagram for the application as shown in fig. The objectives of this application are as follows: [08]
- START PB is used to start the process.
  - When liquid level is below than Ldn sensor then only Vin1 valve is ON.
  - When level reaches to Lmid, Vin valve is OFF, Vin2, Stirrer and Heater are ON (Only during filling time).
  - When level reach to Lup, Vin2 is OFF and when the sensor S2 is energized then stirrer and Heater are OFF and Vout valve is ON.
  - When level goes below Ldn, Vin1 valve is ON again and steps (ii) – (iv) are repeated.
  - STOP PB is used to stop the process at current position. START PB is used to start the process from where it was stopped.



- (C) If starting source 16-bit word is: 1010 1010 1010 1010 [02]  
The bits be allowed to pass : Only bits 2, 3, 4, & 5 of the lower byte and bits 2, 3, 6 & 7 of the upper byte.  
The beginning destination 16-bit word is: 1111 1101 0111 1101  
Then what will the mask & the destination bits after execution of MVM instruction?

**Section II**

Que:-4

- (A) What is sinking & sourcing concept? [06]  
(B) Explain different types of PLC memory. [06]

**OR**

Que:-4

- (A) Explain various layers of SCADA. [04]  
(B) Explain the PLC scan cycle with figure. [04]  
(C) Explain the OSR instruction. [04]

Que:-5

- (A) Explain the discrete AC input module with the block diagram. [06]  
(B) Describe the advantages & disadvantages of Solid-state switching. [05]

**OR**

Que:-5

- (A) Discuss advantages and disadvantages of a PLC. [06]  
(B) List the different types of output modules of a PLC. Brief any one in details. [05]

Que:-6

- Attempt All.** [12]  
(A) Explain sequential function chart (SFC) programming method of a PLC.  
(B) How does the PLC work? Explain with the block diagram.  
(C) Describe the different processor operating modes of a PLC.

**END OF PAPER**