



RM-7125

B. E. - III (I.C.) (Sem. VI) Examination

May / June - 2010

Industrial Control System

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दृशविवेक निशानीवाणी विगतो उत्तरवडी पर अवश्य लखवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. - 3 I.C. (Sem. 6)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Industrial Control System"/>	<input type="text"/>
Subject Code No. : <input type="text" value="7"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="5"/>	<input type="text"/>
Section No. (1, 2,.....): <input type="text" value="1&2"/>	<input type="text"/>
	Student's Signature

- (2) Answers to each section must be written in separate answer books.
(3) Figures to the right indicate maximum marks.
(4) Draw neat figure wherever required.

SECTION - I

- 1 Answer the short questions :
- (1) What is scan cycle ? If 10K words of memory are scanned in 10 milliseconds, how many scans will occur every second ? 3
- (2) Draw symbol for following: 2
- (a) Solenoid valve
- (b) Proximity switch
- (c) Temperature switch
- (d) Light.
- (3) Brief about the programming devices that are used to enter a program into the PLC. 3
- (4) List the memory bit address for an input connected to an A-B PLC-5/15 rack 3, module group 4, terminal 10. 3
- (5) Branching instructions are used to _____. 1
- (a) create a parallel circuit
- (b) develop a logic AND circuit
- (c) create a series circuit
- (d) enable all of the above.

- (6) An address for a given input or output can only be used once in a ladder program unless additional wiring is done. (True/False). 1
- (7) The vertical lines on a ladder diagram are called _____ and the horizontal lines are called _____. 1
- (8) Draw wiring diagram when PLC is in sourcing and field device is sinking the current. 3
- 2** Attempt any three : 21
- (a) Explain error control and checking in data communication system.
- (b) Brief about PLC memory organization. Determine memory size needed for a programmable controller system with 500 input and 500 outputs (assume 40% spare memory capacity).
- (c) Discuss various criteria that are important for wire selection.
The flow transmitter, which transmits 4 to 20 mA current, is connected with analog input module of PLC through 20 AWG wire (Resistance $20 \Omega/1000$). The distance between the FT and PLC is 5000.' Calculate the total loop resistance and voltage drop in wire when input transmitter send maximize current to PLC. Also show the wiring diagram for the above system.
- (d) Discuss important electrical, mechanical and environmental specification required to correctly design I/O systems.
- 3** Attempt any two : 14
- (a) Draw the ladder diagram for the following sequence :
System I/O : Pump (%I0:00, MOV(I0:01), High LEVEL, SWITCH(%I0:02), Low level switch (%I0:03)
When level in tank is low (when low level switch is high) first Mov is open, after 10 seconds pump is starts, once level in tank is high (when high level switch is high) first stop the PUMP and after 10 seconds.
- (b) Explain BTI instruction.
Write ladder diagram for following problem :
A temperature transmitter connected to an analog I/P module has a range of 100'c to 500'c. This signal is converted from 0 to 100% in analog module and stored in F8:20. Design a ladder logic program to convert the signal back to engineering unit and store the result in location F8:25.

- (c) Brief about IL language syntax.
Write a ladder diagram to search the data in integer file N40, words 0 through 99 and compare for an equal condition to data in file N50 starting at word 0, if input bit I:000/03 is true.

SECTION - II

- 4 (a) Answer the following questions in brief : 10
- (1) Using the final value theorem find the value that the following function reaches as $t \rightarrow \infty$
- $$y(t) = 1 - 5e^{-0.5t} \sin(6t + 2)$$
- (2) In two element drum level control which two parameters are measured ?
- (3) Why three element drum level control is called so ?
- (4) List different categories of control systems.
- (5) List the types of distillation process.
- (b) What is feed forward control ? Explain in detail, Also discuss its advantages and disadvantages over feed back control. 10
- 5 Attempt any three :
- (a) Explain the general process of power plant. Also discuss the armature reaction in generator ? 10
- (b) List different types of distillation process and explain any one. 5

OR

- 5 (a) Explain the feed forward control for tubular heat exchanger in detail. Also discuss its advantages over feedback control. 10
- (b) Explain the temperature control for the jacketed reactor. 5
- 6 (a) Explain the necessity of turbine speed control and also explain any one method to measure turbine speed. 8
- (b) Explain the steam pressure control for boiler drum. 7

OR

- 6 (a) Draw and explain the complete process control systems for the distillation process. 9
- (b) Discuss : 6
- (i) Variable time constants
- (ii) Process gain.