Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

SIXTH SEMESTER B.Tech. DEGREE END SEMESTER EXAMINATION
May/June 2016
SUBJECT: PROGRAMMABLE LOGIC CONTROLLERS (ICE - 344)
(Open Elective)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Draw the input and output modules of PLC and explain the significance of an opto-isolator in input and output modules.

1B. Describe the need of PLCs in process control industries with a suitable example.

1C. Explain the sequential function chart (SFC) which is used in PLC programming.

(4+4+2)

2A. Briefly explain working of PLC.

2B. List the general rules to construct the ladder logic in PLC programming.

2C. Explain the power supply of PLCs.

(4+3+3)

3A. With neat diagrams, describe PID controller and draw the Siemen's PLC PID instruction.

3B. Create a ladder logic program that will start when input *A* is turned on, for the series X= 2[LN(n)-1]. The value of *n* will start from 0 and will increase by 2 until n=20 with each scan of the ladder logic. While the sequence is being incremented, any change in *A* will be ignored.

3C. With neat timing diagrams, explain positive edge triggered UP and DOWN counters.

(5+2+3)

4A. Write a ladder logic program for the following
   i. When button A is pushed, a light will flash for 5 seconds.
   ii. The flashing light will be on for 0.25 sec and off for 0.75 sec.
   iii. If button A has been pushed 5 times the light will not flash until the system is reset.
   iv. The system can be reset by pressing button B.

4B Write ladder logic and instruction list for the following liquid level system. Liquid level system consists of two level sensors A, B and a motor. Sensor A is placed at top of the tank and sensor B is placed at middle of the tank. Initially the tank is empty; at this condition motor should be ON. Once the liquid level reaches to sensor A motor should be turned OFF. Motor should be in OFF condition until liquid level drops below sensor B. when liquid level drops below sensor B, again motor should be turned ON and maintains the ON condition until level reaches to A. Use one start and stop buttons. Draw the truth table for this liquid level system.

4C Explain the following instructions:

i. ATN ii. SKIP iii. CONV iv. MOVE

(5+3+2)

5A. Write ladder logic for automatic drilling machine shown in Fig. Q5A. The operation of the drilling machine is described below,

i. Component is placed in fixture manually.
ii. Master ON push button is pressed to turn ON the machine.
iii. System is put in Auto mode by pressing Auto mode push button.
iv. Door sensor is used to sense the door close or not.
v. A signal from door sensor will clamp the component.
vi. After 3 seconds delay spindle motor is turned ON.
vii. After 2 seconds delay Coolant motor is turned ON.
viii. Drilling arm moves down until reed switch 1 (RS1) is sensed.
ix. After drilling operation, the arm moves up until reed switch 2 (RS2) is sensed.
x. Coolant motor turns off.
xi. Safety door is opened.
xii. Component unclamps.

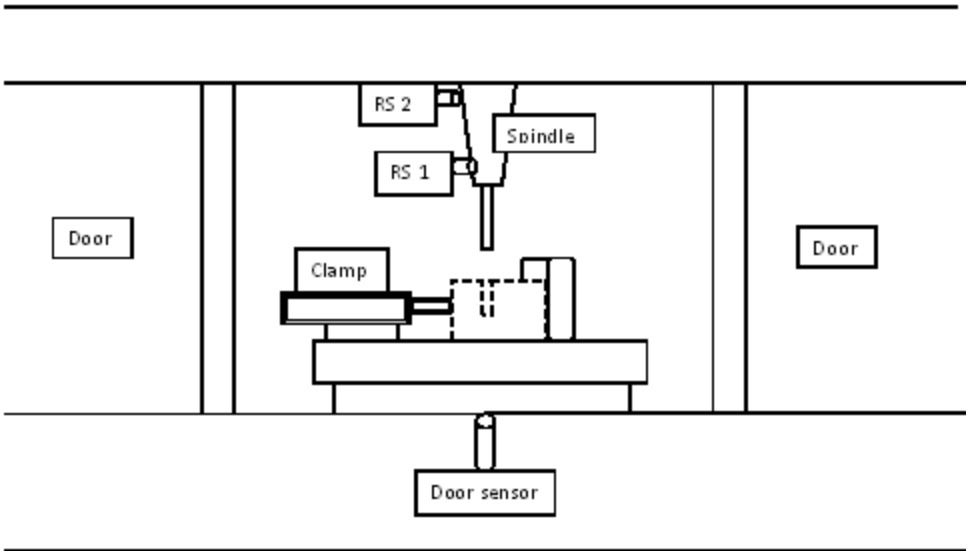

Fig. Q5A

5B. Illustrate the short frame and long frame addressing formats of HART protocol.

5C. Explain the different types of levels included in industrial control.

(4+3+3)

6A. Describe any one application of field bus in an automobile industry.

6B. List the different types of communication techniques which are used in HART protocol and mention their advantages and disadvantages.

6C. With an example, explain analog addition operation in PLC.

(3+3+4)