MAY 2017 / 01.06.2017 **Q.P. Code : 812200**

(3 Hours) **[Total Marks: 80]**

N.B: (1) Question No. **1** is **compulsory**.
(2) Attempt any **Three** questions from remaining.
(3) **Figures** to the **right** indicate **full marks**.

1. Answer the following:- [20]
   (a) Explain continuous, discrete and mixed processes with examples.
   (b) Explain the functions of PLC I/O module.
   (c) Why HMI assumes a special significance in SCADA.
   (d) Explain functions of operator station and engineering station of DCS.

2. (a) Explain the PLC ladder diagram instructions - [10]
   ON Timer, OFF Timer and Retentive timer.
   (b) Write a ladder program for a bottle filling application for the given sequence- [10]
   i) When the START button is pressed the conveyor belt motor should be ON till a bottle is sensed.
   ii) The BOTTLE FULL switch senses if the bottle is empty and opens the valve V1.
   iii) The MOTOR starts again till next bottle is sensed.

   Inputs:-
   BOTTLE PRESENT switch- (NO)
   BOTTLE FULL switch- (NO)
   START Push button –(NO)
   STOP button – (NC)
   Outputs :- VALVE V1, MOTOR

   Draw I/O wiring diagrams, show memory calculations and ladder diagram.

3. (a) Explain the need for DCS integration with PLC and computer. [10]
   Also explain the methods of integration.
   (b) With a neat sketch explain how RTU communicates with the field and MTU in SCADA. [10]

4. (a) Explain how SIS is developed using safety life cycle approach. [10]
   (b) Explain ISA - S95 in connection with MES and ERP integration. [05]
   (c) What is the need for alarm management system? [05]

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5. (a) Compare PLC, DCS and SCADA on the basis of [10]
   i) Controllers ii) Processing capabilities iii) Data base
   iv) HMI/GUI v) applications
   (b) Explain with a neat diagram, evolution of DCS. [10]

6. Write Short note on: - [20]
   (a) Scan interval of SCADA system.
   (b) PLC memory organization.
