

Q.P. Code : 5002

(CBSGS Course)

(03 Hours)

[Total Marks: 80]

- N.B.:** 1) Question No.1 is compulsory.
2) Attempt **any three** questions out of remaining five questions.
3) Assume suitable data if necessary.
4) Figures to the right indicate full marks.

-
- Q.1** Solve any four (20)
- (a) Define mechatronics and explain factory automation, home and office automation with examples.
 - (b) Distinguish between pneumatic, hydraulic and electrical actuators with its applications.
 - (c) Describe the principle of operation of a D.C. motor.
 - (d) Explain in brief various elements of CNC machine.
 - (e) What is voice coil actuator ?
 - (f) Explain Universal Asynchronous Receiver and Transmitter (UART).
- Q.2** (a) How heat dissipation in DC motor is influenced by velocity profile and coupling ratio. (8)
- (b) Two double acting hydraulic cylinders A and B are selected for an industrial application. Draw electro electrohydraulic circuit for the sequence of operation (A+B+ delay B- A-) using 4/3 way double solenoid as the final directional control valve. (12)
- Q.3:** (a) Describe possible speed control strategies of A.C. Induction motors (8)
- (b) Discuss on voltage-torque characteristics of D.C. motor. (8)
- (c) Explain Autonomous Mobile Robot with its applications. (4)
- Q.4** (a) Explain data acquisition system and supervisory control and data acquisition (SCADA). (08)

- (b) A Process tank shown in Figure 1 is sequenced to mix liquid fertilizer (12) according to following sequence of operation.
- (i) A start push button is pressed to start the operation and V_1 is being operated to open in order to fill tank up to a preset level sensed by level switch A. (ii) As the tank fills, a level switch A closes NO contact to energize the stirrer motor to start automatically and operate for 5 sec to mix the fluid. (iii) When stirrer motor stops, the solenoid operated water valve V_2 is energized to empty the tank. (iv) When tank is completely empty, the level switch B opens and de-energizes solenoid operated water valve V_2 (v) A Stop button is pressed to stop operation.

Draw PLC ladder diagram to achieve the above sequence of operation.

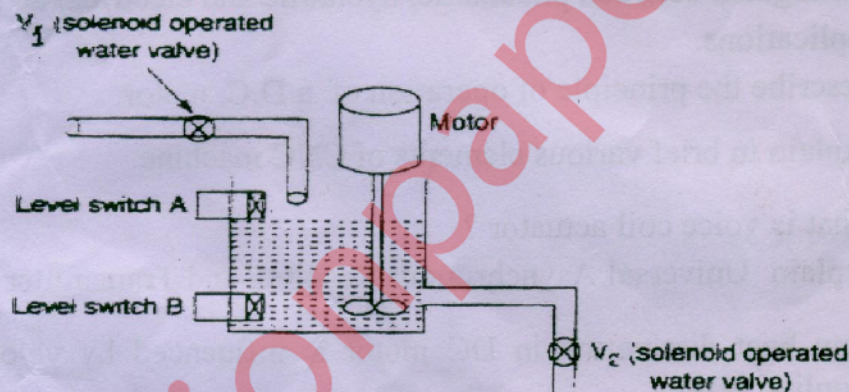


Figure 1

- Q.5 (a) What is the difference between parallel and series interface. (4)
- (b) How data loggers are used in data acquisition system. (4)
- (c) Two double acting cylinders A and B are selected for industrial automation. (12)
The motion of sequence A+B+(rapid approach) B+(slow feed) B- A-
Draw Pneumatic circuit diagram and step displacement diagram. Select 5/2 way final directional control valves.
- Q.6 (a) Explain the basic principle of piezoelectric drives and give its applications. (8)
- (b) Explain the working principle of stepper motor and describe its various types along with its applications. (12)