40x3+35+6

T.E. Mech VI CBSGS

8.6.17

(172)

Q.P. Code:13867

03 Hrs

[Total Marks 80]

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

Q.1 (A) With a neat sketch explain basic components of pneumatic systems. 5

(B) With a neat sketch explain working principle of comb drive actuator 5

(C) Write short note on supervisory control and data acquisition (SCADA) 5

(D) Explain with neat sketch principle of operation of DC motor 5

Q.2 (A) With neat sketch explain the constructional feature and working of relief valve used in hydraulic system 5

(B) Explain the central theme of velocity profile optimization of DC motor 10

(C) Write short notes on (i) Universal Asynchronous Receiver and Transmitter (UART) (ii) Peizoelectric drive 10

Q.3(A) Two double acting pneumatic cylinders A, B are selected for an industrial application. The sequence of movement for piston of the cylinder is proposed as below—

A+ Delay B+(AB)-

Develop the electropneumatic circuit using 5/2 double solenoid as final directional control valves. The piston motions mentioned in bracket is simultaneous.

(B) Explain impedance matching for a part of electromechancial system that consists of transmission of power using motor-gear drive system. 10

Q.4 (A) What are the different elements of a CNC machine? Explain in detail. 10

(B) With neat diagrams illustrate the working of Filter-Regulator-Lubricator (FRL) unit in a pneumatic system. 5

(C) Explain with neat sketch working principle of AC induction motor 5

Q.5(A) Piezo sensor and actuators are proposed in cantilever beam vibration control application. For such application student shall propose the conceptual design under considering following aspects 10

(i) Modeling of Beam
(ii) Sensor and actuator interfacing
(iii) Beam experimental set up (Draw block diagram of proposed designed set up)
(iv) Instrumentation set up (comprise of charge amplifier voltage amplifier, and data acquisistion)

(B) Describe possible speed control strategies of A.C. Induction motors 5

(C) Write a short note on servo amplifier for DC motors 5

Q.6 (A) A Process tank shown in figure is sequenced to mix liquid fertilizer according to following sequence of operation. 10

(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.

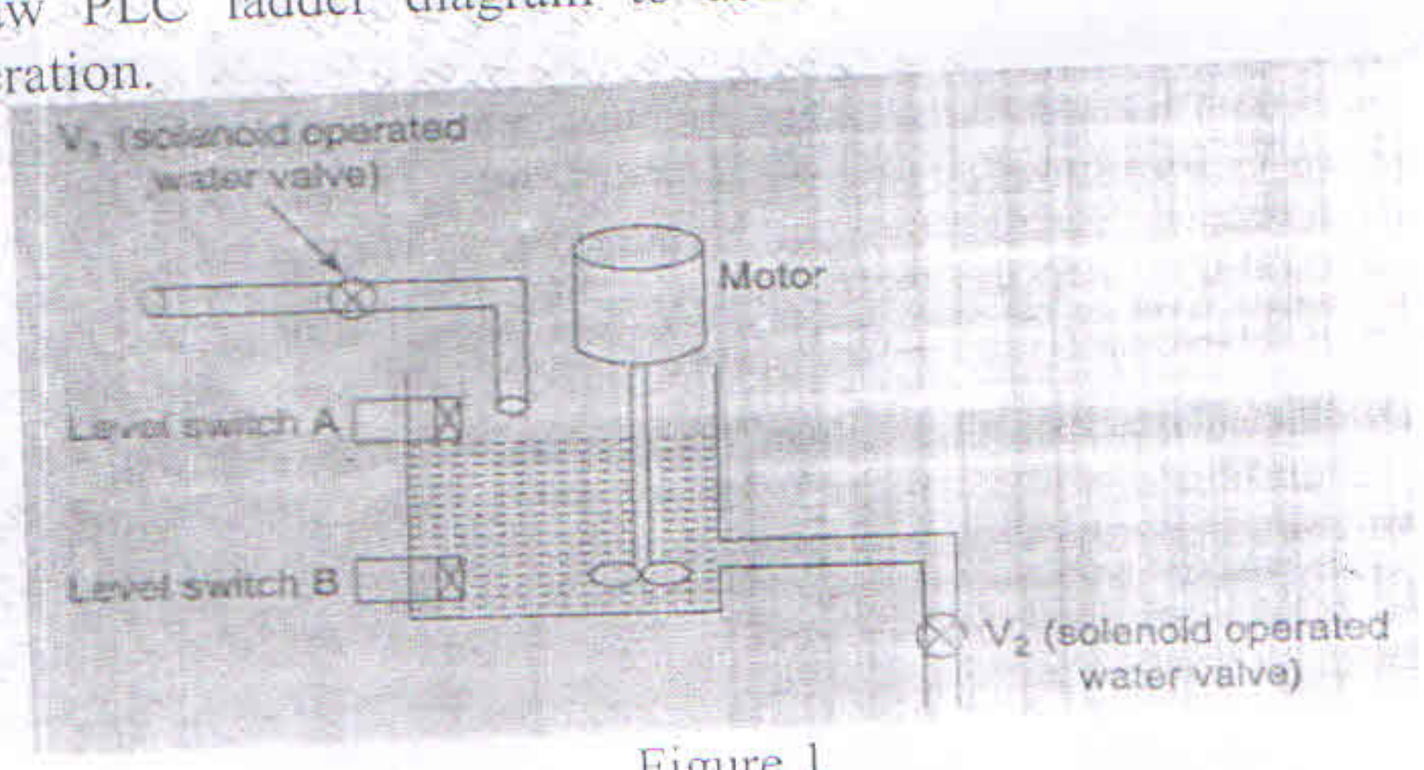

Figure 1

(B) Write short note on (i) Peripheral Interface Device (PIA) 10
(ii) Voice-coil actuator

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