QP Code :601402

(CBGS)
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)   Explain Universal Asynchronous Receiver and Transmitter (UART)   05

(B)   With a neat block diagram explain the architecture of a mechatronic system.   05

(C)   Write short note on supervisory control and data acquisition (SCADA)   05

(D)   Write short notes on (i) Harmonic drive (ii) Data loggers   05

Q.2 (A)   With neat sketch explain the constructional feature and working of pressure relief valve used in hydraulic system   05

(B)   Explain the central theme of velocity profile optimization of DC motor   05

(C)   Explain with neat sketch principle of operation of AC induction motor   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—   12

A+ Delay B+ Delay (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.   08

Q.4 (A)   Explain input and output components (typically sensors, actuators and motors) used in Wireless Surveillance Balloon   10

(B)   With neat diagrams illustrate the working of Filter-Regulator-Lubricator (FRL) unit in a pneumatic system.   05

(C)   Explain with neat sketch working principle of DC motor   05

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Q.5(A) With schematic representation explain the mechatronic system 10 typically used in robot for firefighting application (typically highlight the selection of motor, sensors and switches. Also discuss their interfacing.

(B) Describe possible speed control strategies of A.C. Induction motors 05

(C) Write a short note on servo amplifier for DC motors 05

Q.6 (A) A process control system illustrated in Figure 1 is used to fill the 10 bottle and convey the same. The outlet valve is opened to fill the bottle as when the limit switch senses the presence of the bottle and is closed automatically when the photosensor produces the signal as when the bottle is filled. The level of water in the tank is maintained through a control valve. Develop a PLC ladder logic diagram for this control application.
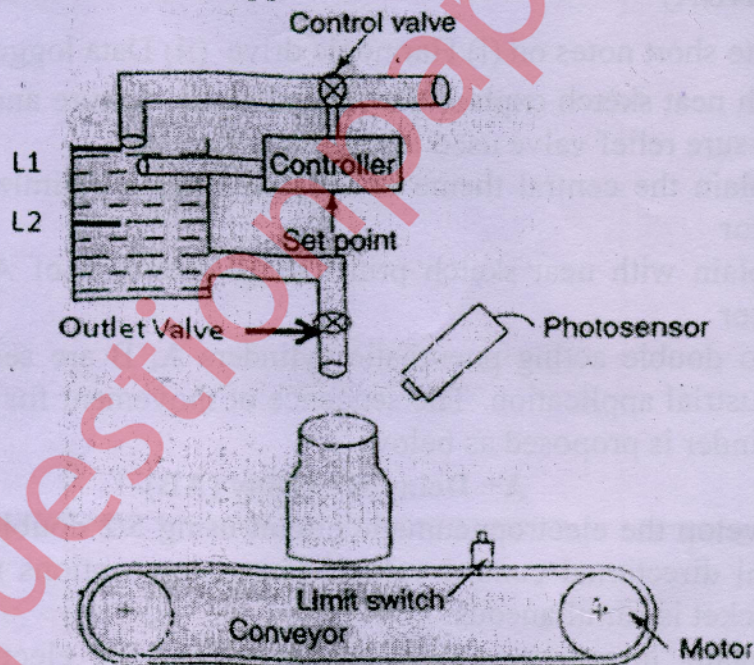

Figure 1

(B) Write short note on (i) Piezoelectric drive (ii) Voice-coil actuator 10