MECHATRONICS

Q.P. Code : 27639

[Time: 3 Hours]   [Marks: 80]

Please check whether you have got the right question paper.

N.B: 1. **Question No.l 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.l (A) Explain the following (Any Four)   05
        1) Piezoelectric drive
        2) Universal Asynchronous Receiver and Transmitter (UART)
        3) Voice-coil actuator
        4) Data loggers
        5)CNC Machines

Q.2 (A) With neat sketch explain the constructional feature and working of pressure relief valve used   05
        in hydraulic system
    (B) Describe possible speed control strategies of A.C. Induction motors   05
    (C) Write a short note on servo amplifier for DC motors   10

Q.3 (A) Two double acting pneumatic cylinders A, B are selected for an industrial application. The   12
        sequence of movement for piston of the cylinder is proposed as below—
        (AB)+ Delay B+ A-
        Develop the electro-pneumatic 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 electro-mechancial system that consists of   08
        transmission of power using motor-gear drive system.

Q.4 (A) Explain input and output components (typically sensors and actuators) used in Car Engine   10
        Management System.
    (B) With neat diagrams illustrate the working of Filter-Regulator- Lubricator (FRL) unit in a   05
        pneumatic system
    (C) Differentiate between Serial communication and parallel communication interface.   05

Q.5 (A) A conveyor motor is required to program using a PLC in a process line based on the number of   10
        bottles coming off the conveyor as shown in Figure l.A photo-sensor is used to sense the passage
        of the bottle. Develop a PLC ladder logic diagram for the following sequential tasks
        i)The start pushbutton can be pressed to start the conveyor
        ii) Bottles move past the photo-sensor and the conveyor motor stops automatically after a
        count of 25 bottles.

iii)The counter is to be reset to zero after 25 counts

The accumulated count of the counter is reset manually by means of the count reset button
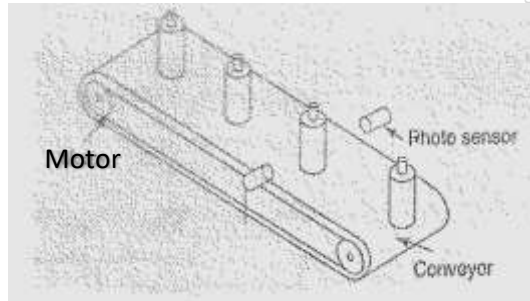
(B) Explain the central theme of velocity profile optimization of DC motor   05

(C) Explain with neat sketch principle of operation of AC induction motor   05

Q.6 (A) With schematic representation explain the mechatronic system typically used in robot for firefighting application (typically highlight the selection of motor, sensors and switches. Also discuss their interfacing.   10

(B) Write short note on (i) Supervisory control and data acquisition (ii) Harmonic drive   10

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