

(3 Hours)

[Total marks: 80]

Instructions:

1. **Question 1 compulsory.**
2. Attempt any **three** questions from the remaining **five** questions.
3. Assume suitable data, **if necessary.**
4. **Figures/sketches** carry weightage.

- Q1) Explain the following [ Any four] 20
- 1) Components of Mechatronics
  - 2) Autonomous Robot
  - 3) Parameters to be considered for selection of an actuator
  - 4) Servo Amplifier
  - 5) Buffers
- Q2) a) Explain the concept of Handshaking, Polling and Interrupt 07
- b) Explain harmonic drive with a neat sketch 07
- c) Explain the optimization of velocity profile optimization in DC motors 06
- Q3) a) Explain the following 10
- i) Inertia Matching ii) Accumulator
- b) Two double acting pneumatic cylinders are selected for an industrial application ;The sequence of the movement is as given below:- 10
- (AB)<sup>-</sup>, A+B+
- Draw a pneumatic circuit
- Q4) a) Explain SCADA with a neat sketch 07
- b) Mechatronics used in Office application with a neat block diagram 07
- c) Explain selection process of PLC 06
- Q5) a) Two double acting pneumatic cylinders are selected for an industrial application ;The sequence of the movement is as given below:- 10
- A +, B-, Delay (A-B+) Delay, B-Delay.
- Draw electro pneumatic circuit using 4/2 DC valve which is single solenoid and spring operated using single cycle operation and also sketch the displacement diagram
- b) With a neat sketch explain the constructional features, working and application of a Voice Coil Actuator. 10
- Q6) a) Explain the constructional features and working of an Engine Management system with a neat sketch 10
- b) Explain the following: 10
- i) Universal Asynchronous Receiver and Transmitter ii) Key elements of mechatronics
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