Reg. No. :

Question Paper Code: 47703

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Seventh Semester

Mechanical Engineering

14UME703 - MECHATRONICS

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The sensors are classified on the basis of

    (a) Functions   (b) Performance   (c) Output   (d) All of the above

2. Inductive proximity sensors can be effective only when the objects are of _____

    materials.

    (a) Ferro magnetic   (b) Diamagnetic   (c) Paramagnetic   (d) All of the above

3. The type of drive suitable for high torque application is

    (a) Pneumatic drive   (b) Electric drive   (c) hydraulic drive   (d) Vector drive

4. What is the function of electric actuator?

    (a) Converts electrical energy into mechanical energy

    (b) Converts mechanical torque into electrical energy

    (c) Converts mechanical energy into mechanical torque

    (d) None of the above

5. Variable speed cannot be obtained with _____.

   (a) DC motors controller   (b) AC motor controller

   (c) resistance, capacitance & inductance   (d) AC & DC controllers

6. _____of PLCs can be done in very little time.

   (a) Programming   (b) Installation

   (c) Commissioning   (d) All of the above

7. PLC operates with _____ voltage.

   (a) 24 DC   (b) 5 VDC   (c) 440 VAC   (d) 240 VAC

8. PLCs are programmed using what language?

   (a) Natural Language such as English   (b) C-language

   (c) Relay-ladder logic   (d) None of the above

9. Engine management system is made up of

   (a) Sensors   (b) Actuators

   (c) Microprocessor   (d) All of the above

10. Sensors detect a_____

   (a) Mechanical condition   (b) Chemical state

   (c) Temperature conditioning   (d) All of the above

PART - B (5 x 2 = 10 Marks)

11. Define hysteresis loss

12. What is servo motor?

13. Define Adaptive control

14. List any four criteria for selection of PLC.

15. What is engine management system?

PART - C (5 x 16 = 80 Marks)

16.(a) With neat sketch explain the working principle and applications of the any one Flow Sensors.   (16)

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(b) With neat sketch explain various bonded type strain gauges. (16)

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17. (a) (i) Explain in detail about various types of stepper motor. (10)

(ii) List the advantages and disadvantages of stepper motor. (6)

Or

(b) Explain the four quadrant operation of a dc drive. (16)

18. (a) Compare the control system performance for a system with proportional control and a system with integral control (16)

Or

(b) With neat sketch explain the building blocks of Mechanical, Fluid and Thermal System. (16)

19. (a) Explain the basic structures of PLC. Explain in detail about the programming of a PLC. What are the advantages of PLC? (16)

Or

(b) Explain the features of programmable controller with a description of the instruction sets. (16)

20.(a) Consider two mechatronic products and describe how they are designed using the conventional electro-mechanical product design approach and mechatronic product design approach (16)

Or

(b) Present a case study pertaining to the design of a wireless surveillance balloon. (16)

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