Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 21863

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Mechanical Engineering

ME 2401/ME 71/ME 1402/10122 ME 702 — MECHATRONICS

(Common to Production Engineering)

(Regulations 2008/2010)

(Common to PTME 2401/10122 ME 702 – Mechatronics for B.E. (Part-Time) Fifth Semester, Mechanical Engineering – Regulations 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List down the key elements of Mechatronics?

2. Name few types of proximity sensors.

3. Write the governing equation for the motion of a DC motor.

4. Brief on the interaction between the mechanical and electrical behavior of the piezoelectric actuator materials.

5. What is meant by open loop adaptive control?

6. State the advantage of analog continuous controllers over discrete sampled data controller.

7. Why latching is needed to switch on the DC motor?

8. Draw a ladder diagram for NAND operation.

9. Draw the characteristics of engine temperature sensor.

10. Differentiate between prismatic joint and revolute joint.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the working, construction and specification of the following: MPX sensor, Hall effect sensor, Thermocouples and photodiodes. (10)

(ii) Discuss microprocessor based controllers with example. (6)

Or

(b) (i) Explain the principle of the following : Bonded strain gauge, acceleration sensor, RTD, and microsensors. (10)

(ii) Define all the dynamic characteristics of sensors. (6)

12. (a) Explain the pneumatic power supply system and discuss on rotary actuators.

Or

(b) With neat sketches explain various types of stepper motors with their control.

13. (a) (i) Explain the PID controller with an example of DC motor speed control. (10)

(ii) Discuss on building blocks of electrical system. (6)

Or

(b) (i) Explain the building blocks of fluid system with suitable examples. (10)

(ii) Discuss on rotational systems. (6)

14. (a) (i) With a neat sketch discuss about the internal structure of a PLC. (10)

(ii) Discuss on selection of PLC. (6)

Or

(b) (i) Discuss in detail about data handling. (8)

(ii) Explain about mnemonics with examples. (8)

15. (a) Design Automatic Tool Changer (ATC) of a CNC machine.

Or

(b) Discuss in detail about mechatronic design of Automated Teller Machine (ATM).

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