Reg. No. :

Question Paper Code : 42857

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Mechanical Engineering
ME 2401 – MECHATRONICS
(Common to Production Engineering)
(Regulations 2008)
(Common to PTME 2401 – Mechatronics for B.E. (Part-Time) Fifth Semester
Mechanical Engineering – Regulations 2009)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. What is meant by the term real system in mechatronics ?

2. Define power rating of a potentiometer.

3. State any two differences between micro switch and reed switch.

4. What is meant by a spool valve ? State its function.

5. Distinguish Hydraulic resistance and Hydraulic capacitance.

6. What are the limitations of two-step control ?

7. What is cascading of timers ?

8. Why PLC's are considered for shop floor ?

9. What is the basic principle involved in mechatronics design ?

10. Identify the main sensors used in a domestic washing machine.

PART – B (5×16=80 Marks)

11. a) i) List and explain the static characteristics of transducers. (8)

ii) Discuss about push-pull sensor and capacitive proximity sensor. (8)

(OR)

b) i) Draw and explain the closed loop control system with example and the applications. (8)

ii) Explain any three sensors which are used for degree of hotness measurement. (8)

12. a) i) Explain the four types of cams with its special features. (8)

ii) Describe the working of a compound belt drive with a neat sketch. (8)

(OR)

b) i) Determine the input pulse rate, if the stepper motor has 10° per step and rotating at 400 rpm. (6)

ii) With a suitable graph, discuss the specifications and characteristics of a stepper motor and its characteristics. (10)

13. a) i) Derive a mathematical model for a spring mass-damper system. (8)

ii) Explain the working of a PID controller with an aid of a neat circuit. (8)

(OR)

b) i) With the help of a block diagram, explain digital logic control. (6)

ii) Draw the equivalent free body diagram for the system shown in Fig. 1 and derive the differential equation. (10)

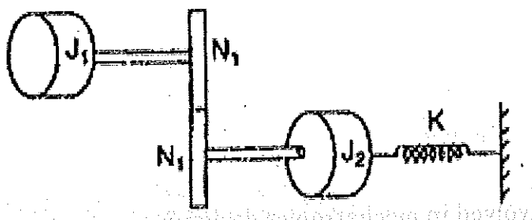

Fig. 1

14. a) i) Draw the ladder diagram of logic gates using PLC. (8)

ii) Develop a circuit that could be used with a domestic washing machine to switch on a pump to pump water for 100 sec into the machine, then switch off and switch on a heater for 50 sec to heat the water. The heater is then switched off and another pump is to be empty the water from the machine for 100 sec. (8)

(OR)

b) i) Explain the applications of internal relays and counters with neat circuit diagram. (10)

ii) Discuss how a PLC can be used to handle an analog input. (6)

15. a) i) Discuss the various stages involved in the design of a mechatronic systems. (8)

ii) Compare and contrast the traditional and mechatronic design approach applicable for on-line inspection. (8)

(OR)

b) i) Explain the various mechatronics elements required to design an automated guided vehicle. (8)

ii) Detail about the various functional components in a wireless surveillance balloon system. (8)