

Reg. No. : 

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**K 4394**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Seventh Semester

(Regulation 2004)

Mechanical Engineering

ME 1402 — MECHATRONICS

(Common to B.E. (Part-Time) Sixth Semester Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a measurement system?
2. Explain the following terms : Response Time and Rise Time.
3. What is the function of a poppet valve?
4. What is the application of ratchet and pawl?
5. Differentiate between ROM and EPROM.
6. What is a Ladder Diagram?
7. Write the equation for first order and second order systems.
8. Why are PLC's considered suitable for shop floor?
9. What is the basic principle involved in mechatronics design?
10. What are Embedded systems?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw the sketch of a closed loop control system and explain the basic elements in the above system. (8)
- (ii) Explain shaft control system with a neat sketch. (8)

Or

- (b) (i) Explain the principle and operation of optical encoders. (8)
- (ii) Describe the piezo electric sensors and tactile sensors. (8)
12. (a) (i) Explain the principle of a pilot-operated valve. (8)
- (ii) Describe how a sequential valve can be used to initiate an operation only when another operation has been completed. (8)

Or

- (b) (i) Explain the principle and operation of a relay controlled system. (8)
- (ii) Discuss the various types of D.C. motors and also control of D.C. motors. (8)
13. (a) (i) Explain the mathematical model for rotating mass on the end of a shaft and for torsional spring mass system. (8)
- (ii) Distinguish between continuous and discrete process controllers. (8)

Or

- (b) (i) Discuss the principle and operation of PID controller. (8)
- (ii) Explain the principle and operation of self-tuning circuit. (8)
14. (a) (i) Describe the different logic functions and their performance. (8)
- (ii) How is sequencing done in a pneumatic system? (8)

Or

- (b) (i) Discuss the following :  
Timer, Cascaded Timer and On-off Cyclic Timer. (8)
- (ii) Explain how the shift register can be used for sequencing events. (8)

15. (a) (i) Explain the various design process involving different stages. (8)
- (ii) What are the differences between traditional and mechatronics designs? (8)

Or

- (b) Explain with a diagram how a micro controller can be used to control solenoid valves to actuate a robot unit. (16)