C 3404

B.E./B.Tech DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Sixth Semester

Mechatronics Engineering

MH 1353 — DESIGN OF MECHATRONICS SYSTEM

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the role of GUI in mechatronic systems?

2. How does the concept of mechatronics ensure products with more synergy?

3. What are the requirements of real time interfacing?

4. What is overframing in real time operations?

5. Sketch the general block diagram of a data acquisition system, neatly labeled.

6. State the type of sensors used in robots, application wise.

7. Explain Pinball Tilt Sensor and Actuator system briefly.

8. What are the mechatronic elements in an auto focusing camera?

9. Explain any one of the search strategies used in Artificial Intelligence.

10. What do you mean by fuzzy rule base?

11. (a) (i) With the help of a block diagram, briefly explain the key elements of a mechatronic system. (8)

    (ii) Present the general scheme of hardware and software integration in realizing a mechatronic system. (8)

Or

(b) (i) Explain the three phases of mechatronic design process, with a block diagram. (9)

    (ii) Discuss about the advanced mechatronic approach for designing the supervisory control system in machining process. (7)

12. (a) (i) Explain the five major components of a data acquisition and control system. (8)

    (ii) Elaborate on the necessary ingredients for the general I/O process, required as part of a mechatronic system. (8)

Or

(b) (i) How is the problem of overframing overcome in real time system simulation? Suggest the alternatives. (10)

    (ii) Write short note on analog, discrete and frequency signals. (6)

13. (a) Explain the following case studies related to mechatronic system :

    (i) Cantilever beam system

    (ii) Testing of transportation bridge surface materials. (8+8)

Or

(b) (i) What are the problems in the traditional approach to the calibration of the motion transducers in diesel engine exhaust valves? Explain the transducer test rig and the necessary circuit diagram to introduce mechatronics for solving these problems. (9)

    (ii) Explain the issues involved in the design of a strain gauge based weighing system and bring out the application diagram of the system. (7)

14. (a) (i) Develop a mechatronic system to study the fatigue failure of ceramic plate subjected to thermal cycling. (9)

    (ii) Explain the experimental set-up needed for a DAC system for pH neutralization. (7)

Or

(b) (i) It is desired to design a mechatronic control and management of a car engine system. Discuss about its implementation issues, with an illustrative block diagram. (11)

(ii) In what way the concept of mechatronics can be incorporated into DC motor based motion control? (5)

15. (a) (i) Write short note on the application of mechatronics in the following:

Vibration monitoring: Wear behaviour monitoring (4+4)

(ii) What do you mean by on-line quality monitoring? Elaborate on the methodology of on-line inspection system adopted in an automated manufacturing system. (8)

Or

(b) (i) How do Artificial Neural Networks simulate human intelligence? What are their distinct features? (6)

(ii) Explain knowledge based systems applied to manufacturing. (5)

(iii) Explain the principle of microsensor measurement principle briefly. (5)