B.E., DEGREE EXAMINATIONS, APRIL/MAY 2014

(Regulation 2009)

Seventh Semester

MECHATRONICS ENGINEERING

MCT120: Design of Mechatronics System

Time: Three Hours **Maximum Marks: 100**

Answer All Questions

PART A (10 x 1 = 10 Marks)

1. In feedback system, the system's

   A. Stability increases B. Gain increases

   C. Sensitivity increases D. Disturbances increases

2. _____ is the simultaneous design and development of all the processes and information needed to produce a produ ct, to sell it, to distribute it, and to service it.

   A. Concurrent engineering (CE) B. Simultaneous engineering

   C. Integrated product development D. All of the above.

3. A signal contains components with frequencies up to 10 kHz, although no useful information is contained at frequencies above 6 kHz. What is the minimum frequency at which the signal should be sampled?

   A. 6 kHz. B. 12 kHz. C. 14.4 kHz. D. 20 kHz.

4. What is meant by a single-chip data acquisition system?

   A. A single integrated circuit containing a DAC and a de-multiplexer

   B. A single integrated circuit containing all the elements of a data acquisition system

   C. A single integrated circuit containing an ADC and a multiplexer.

   D. A single integrated circuit containing an ADC and a DAC.

5. The output voltage of a typical thermocouple is:

   A. less than 100 millivolts B. greater than 1 volt

   C. thermocouples vary resistance, not voltage D. none of the above

6. CD player consists of _____ sensor

   A. MAP sensor B. Angle sensor C. Tilt sensor D. Static ram

7. What does signal processing do?

   A. converts a mechanical input to an electrical output

   B. converts an electrical input to a mechanical output

   C. reduces the effects of noise and other disturbances on the measured quantity

   D. all of the above

8. An error amplifier is used to compare which of the following two signals?

   A. The output of a sensor and the input to a signal processor

   B. The output of a system and the command input of a system

   C. The output of a signal processor and the output of a system

   D. None of the above.

9. What is the Fuzzy Approximation Theorem (FAT)?

   A. A fuzzy system can model any continuous system

   B. The conversion of fuzzy logic to probability.

   C. A continuous system can model a fuzzy system.

   D. Fuzzy patches covering a series of fuzzy rules.

10. Which of the following components is present in both pneumatic and hydraulic systems?

    A. Exhaust B. Reservoir C. Compressor D. Control Valve

PART B (10x2 = 20 Marks)

11. Define ergonomics
12. What is meant by modeling?
13. Write a note on real time interface.
14. What is embedded processor interface?
15. Define design optimization.
16. Write about calibration.
17. What are Deflection Sensors?
18. What are the issues considered while design a Mechatronics based control system?
19. How are fuzzy sets defined in Fuzzy Logic?
20. What is artificial intelligence?

PART C (5 x 14 = 70 Marks)

21. a) Discuss about mechatronics system design and Explain how it is different from traditional system design.

(OR)

b) What is meant by industrial design? Explain in detail.

22. a) Explain in detail about IEEE 488 standard interface.

(OR)

b) What is MMI? And explain in detail about Man machine interface design

23. a) Design a mechatronics system for the application of solenoid force-displacement calibration system. And employ DAQ system.

(OR)

b) Design a mechatronics system for the application of rotary optical encoder system. And employ DAQ system.

24. a) Explain in detail about de icing temperature control system. And show the various control strategies with the help of application diagram.

(OR)

b) Design and a Mechatronics based skip control of a CD player system. And employ data logger.

25. a) Explain in detail about sensor fusion at different levels of condition monitoring system.

(OR)

b) Write short notes on (i) Smart sensors (ii) Defuzzification with respect to fuzzy logic (iii) Micro robot.

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