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18EI731

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Mechatronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What do you mean by sequential control? Illustrate your answer with an example. (10 Marks)
- b. Briefly explain various stages of the design process in mechatronics. (10 Marks)

OR

- 2 a. With necessary diagrams, describe the four stroke sequence of an engine management system. (08 Marks)
- b. Distinguish between open loop and close loop systems. (04 Marks)
- c. Explain the operation of various proximity switches. (08 Marks)

Module-2

- 3 a. Briefly describe the construction and working of a hydraulic system. (08 Marks)
- b. Describe the construction and working of various air compressors. (12 Marks)

OR

- 4 a. Describe the construction and working of the following directional control valves:
i) The spool valve ii) The poppet valve. (10 Marks)
- b. Describe the working of two basic forms of kinematic chains. (10 Marks)

Module-3

- 5 a. With neat diagrams, explain the construction and working of a brushed DC motor. (10 Marks)
- b. What is a stepper motor? List and explain the various types of stepper motors. (10 Marks)

OR

- 6 a. Explain the concepts of Emulation and Simulation. (05 Marks)
- b. Explain how faults can be found in microprocessor-based systems with the help of following techniques and devices:
i) Logic probe ii) Logic pulser iii) Logic dip iv) Logic analyser. (08 Marks)
- c. List and discuss the various types of parity and error coding checks. (07 Marks)

Module-4

- 7 a. With a neat block diagram, explain the interfacing of solenoids with a microcontroller. (10 Marks)
- b. With a neat block diagram, explain the method of interfacing permanent magnet motors with a microcontroller using relay. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. With a neat diagram, explain the interfacing of following sensors with a microcontroller:
i) Diode/phototransistor pair ii) Photoreflector sensor. (08 Marks)
- b. Draw the reliability 'bath tub' life curve of a product and discuss its 3 phases of life. (06 Marks)
- c. Develop a model for reliability of a combination system. (06 Marks)

Module-5

- 9 a. Discuss various principles of validation scheme. (12 Marks)
- b. With neat diagram, explain various types of component of machine control system. (08 Marks)

OR

- 10 a. What is a Robot? With a neat schematic explain the various types of Robots. (10 Marks)
- b. Design the control architecture of the Drilling Machine by adopting DCS philosophy and by implementing fieldbus technology. (10 Marks)

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