Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40842

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Sixth/Seventh Semester

Mechanical Engineering

ME 8791 — MECHATRONICS

(Common to Manufacturing Engineering / Mechanical Engineering (Sandwich) / Mechanical and Automation Engineering / Production Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the key elements of mechatronics?
2. State the purpose of using potentiometer in displacement sensor.
3. What are the functions of accumulator register?
4. How many machine cycles does 8085 have, mention them?
5. What are the operating modes of port A of 8255?
6. What are the ADC and DAC specifications?
7. Write short notes on: ON delay/OFF delay timer.
8. What is interlocking in ladder logic?
9. Define detent torque.
10. How can servo motor be controlled?

PART B — (5 × 13 = 65 marks)

11. (a) Explain in detail the static and dynamic characteristics of a sensor.

Or

(b) Describe performance characteristics of an LVDT and explain eddy current transducer for measurement of linear displacement.

12. (a) Explain with timing diagram the memory read cycle in 8085.

Or

(b) How many interrupt sources are available in 8051? Explain in detail.

13. (a) Interface a 4 digit seven segment display with 8255 and write an ALP to display rotating '2012'.

Or

(b) How do you interface a stepper motor to a controller? Give the necessary hardware and software functional blocks.

14. (a) Draw a ladder diagram for two motor system having following conditions:

(i) Starting push button starts motor 1

(ii) After 10 seconds, motor – 2 is ON

(iii) Stopping the switch stops motor 1 and 2 (Time base 1 sec).

Or

(b) Develop the ladder logic to fill the tank.

(i) Fill the tank up to 80%. When the tank is filled, turn ON the heater to raise the temperature up to 70 deg.

(ii) When this temperature is reached, turn OFF the heater and open the outlet valve.

(iii) When the level in the tank falls below 10%, close the output valve.

15. (a) Explain construction and working of a DC servomotor along with its torque-speed characteristics.

Or

(b) Design a pick and place robot using mechatronics elements and explain the same with relevant examples.

PART C — (1 × 15 = 15 marks)

16. (a) With a suitable example explain the 8085 microprocessor interrupt system in detail.

Or

(b) Considering a computer controlled machine tool (CNC machine tool) as a mechatronics system. Discuss the design considerations and design solutions to those considerations.

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