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

Question Paper Code : 90871

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

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. Define sensitivity and precision.
2. What is seeback effect?
3. What are the buses in microprocessor?
4. Draw the clock circuit of 8085 using oscillator.
5. What are the operating modes of PPI?
6. Sketch the pin diagram of 8255.
7. Mention the programming methods of PLC.
8. Write the ladder program for the given circuit in figure 1.

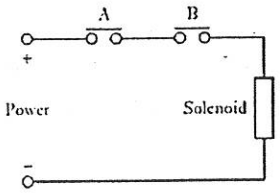

Figure 1

9. Sketch the pneumatic control circuit of automatic car park barrier.
10. Furnish the drawbacks of stepper motor.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the construction and working of strain gauge and capacitive sensor.

Or

(b) Explain the construction and working of LVDT in details.

12. (a) Show the architecture of 8085 and explain the various functional blocks.

Or

(b) (i) Draw the Opcode fetch machine cycle of 8085. (5)

(ii) Illustrate the detailed architecture of 8051. (8)

13. (a) (i) Draw the block diagram of 8255 and summarise the pin functions of ports A, B and C for various modes of operation. (9)

(ii) Show the control word format for I/O mode operation of PPI 8255.(4)

Or

(b) Demonstrate the 4 × 4 Keyboard interfacing of 8255 with flowchart.

14. (a) Construct the ladder logic program for the following Boolean logic equations and logic gates,

(i) $Y = (X_1 + X_2)X_3$

(ii) $Y = (X_1 + X_2)\ (X_3+X_4)$

(iii) $Y = (X_1 * X_2) + X_3$

(iv) NAND and NOR Gate

Or

(b) Brief the construction and I/O details of PLC with neat figure.

15. (a) With neat sketch discuss the construction and working of various types of stepper motors.

Or

(b) Discuss the step by step development procedure of mechatronics system design for integrated engineering product development.

PART C — (1 × 15 = 15 marks)

16. (a) Design a stepper motor interfacing with 8085 using 8255 PPI in detail.

Or

(b) Consider a engine as mechatronics system and with neat illustration show the various types of inputs and outputs of engine management systems.

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