Ref. No.: **EX/PROD/PC/B/T/224/2024**

B.E. PRODUCTION ENGINEERING 2ND YEAR 2ND SEMESTER EXAMINATION - 2024

Subject : MICROPROCESSOR CONTROL AND MECHATRONICS

Time: 3 hours **Full Marks: 100**

ANSWER ANY 10 QUESTIONS

1. Explain the term 'mechatronics'. What do you mean by (i) a sensor, (ii) an actuator, and (iii) a microprocessor? 4+6

2.a) What do you mean by open loop and closed loop control systems? What are the advantages and disadvantages of closed loop control in comparison to open loop control? 6

b) What are meant by the following properties of a sensor? 4
(i) accuracy (ii) resolution

3. Explain the working principle for the measurement of linear displacement using strain-gauge connected in a wheat-stone bridge circuit. 10

4. Explain the working principle of LVDT in measuring linear displacement. What is meant by sensitivity of LVDT? 9+1

5. Distinguish between absolute & incremental optical encoders. Explain the working principle of an incremental encoder. 2+8

6.a) Explain the different methods of representing signed binary numbers with examples. 7

b) What is the advantage of using 2's complement method over 1's complement method for adding signed binary numbers? 3

7. Show a 4-bit controlled 2's complement adder-subtracter, and explain its operation. 10

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8.a) What is the limitation of half adder? How is it overcome in full adder? 4

b) Show a 4x1 multiplexer, and explain its operation. 6

9. Explain the different addressing modes for 8085 microprocessor with suitable examples. 10

10.a) What are the condition flags available in 8085 microprocessor, and what do they indicate? 5

b) What addressing modes are used in the following 8085 instructions? 5
(i) STA 4020 H (ii) SUB D (iii) ADI 83 H (iv) MOV B, M

11. Explain the operations performed by the following 8085 instructions (**any five**): 10
(i) MOV B, D (ii) MVI E, 45 H (iii) LXI H, 2395 H
(iv) ADD B (v) SUI 3A H (vi) LDA 2160 H

12. Write an assembly language program for 8085 microprocessor to add the numbers in registers C and D, then to subtract the number in register B from the sum, and to place the final result in memory location 8090 (hex). 10