B.E. PRODUCTION ENGINEERING 2ND YEAR 2ND SEMESTER EXAMINATION - 2023

MICROPROCESSOR CONTROL AND MECHATRONICS

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

ANSWER ANY 10 QUESTIONS

1. a) What do you mean by a 'mechatronic' system? What are the essential components in a mechatronic system?   6

 b) What do you mean by a sensor and an actuator?   4

2. a) What do you mean by a closed loop control system? 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?
        (i) resolution   (ii) repeatability   4

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

4. Explain the working principle of an absolute encoder. What is the advantage of Gray code in such encoder?   7+3

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

 b) Convert the following decimal numbers into 8-bit signed binary numbers using 2'complement representation:
        (i) 103   (ii) -65   4

6. a) State and prove De-Morgan's theorems for multiple variables in general.   5

 b) What is the limitation of half adder? How is it overcome in full adder?   5

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

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

  b) What are the lengths (in bits) of data bus and address bus in 8085 microprocessor? What is the maximum size (in bytes) of memory that can be used with 8085 microprocessor?   2+2

9.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?
         (i) STA 1020 H   (ii) ADI 8B H   (iii) SUB M   (iv) MOV   B, M   5

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

11. Explain the operations performed by the following 8085 instructions (**any five**):   10
         (a) MOV B, M   (b) LDA 246A H   (c) LXI H, 2060 H
         (d) SUB C   (e) ADI 23 H   (f) ADD M

12. Write an assembly language program for 8085 microprocessor to add the numbers in memory locations 1000 H and 2000 H, then to subtract the number in memory location 3000 H from the sum, and to place the final result in register B.   10