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

Question Paper Code : 91853

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fifth/Seventh Semester

Mechanical Engineering

ME 6702 – MECHATRONICS

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

(Regulations 2013)

(Also common to PTME 6702 – Mechatronics for B.E. (Part-Time) Fifth Semester Mechanical Engineering – (Regulations – 2014))

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. What are the need of mechatronics systems ?
2. Write the working principles of Edey current sensor.
3. Distinguish the microprocessor vs microcontroller.
4. List the various types of Addressing modes.
5. How to select mode B in CWR of 8255 ?
6. Show the pin details of 8255.
7. Define on time delay ?
8. Brief the program scan cycle of PLC.
9. What is modeling in design process ?
10. A stepper motor has a step angle of 1.8 degree. How many pulses required for the motor to rotate through five complete revolutions ?

PART – B (5×13=65 Marks)

11. a) A steel cantilever is 300 mm long, 25 mm wide and 5 mm thick.

i) Calculate the value of deflection at the free end for the cantilever when a force of 30N is applied at this end. The modulus of elasticity for steel is 200 GPa. (4)

ii) An LVDT with a sensitivity of 0.6 V/mm is used. The voltage is read on a 20 V voltmeter having 100 divisions. Two-tenths of division can be read. Calculate the resolution of the LVDT. (4)

iii) Find the minimum and maximum value of force. (5)

(OR)

b) Consider a parallel rectangular plate air spaced capacitor of 30 cm × 20 cm and the distance between the plates is 1.2 mm. If the relative permittivity for air is 1.006. Calculate the displacement sensitivity of the device by neglecting the displacement of the central plate. Assume permitittivity of the plates as 8.854×10^{12} F/m. (13)

12. a) Sketch the timing diagram for the instruction LDA, 9FH. (13)

(OR)

b) The list of mnemonics are given below. Write the corresponding decimal, binary and hexadecimal number of 8085 microprocessor mnemonics to understand the function of assembler. (13)

Sl.No	1	2	3	4	5	6
Mnemonics	LXI B	STAX B	INX B	INR B	DCR B	MVI B

Sl.No.	7	8	9	10	11	12	13
Mnemonics	DAD B	LDAX B	DCX B	INR C	DCR C	MVI C	RRC

13. a) Design an interfacing diagram of ADC with 8085 microprocessor in detail. (13)

(OR)

b) Design a keyboard and 7 segment LED display interfacing with 8051 microcontroller for Hexadecimal Characters. (13)

14. a) With neat sketch explain the architecture of PLC and its I/O connection for various system interfacing. (13)

(OR)

b) Furnish the list of PLC programming methods. Design a hardwired relay logic circuit, ladder logic circuit for the given program.

START PB1

AND CR1

OR LS1

AND NOT CR2

OUT SOL (13)

15. a) Design and explain the fluid power actuator based pick place robot. (13)

(OR)

b) Elaborate the design stages involved in mechatronics system development in detail. (13)

PART – C (1×15=15 Marks)

16. a) Design a unipolar stepper motor interfacing circuit with 8051 microcontroller. Write an assembly language programming for interfacing stepper motor in detail.

(OR)

b) Design a servomotor motor interfacing for speed, position and direction control using 8051 microcontroller.
