A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 96704

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Sixth Semester

Mechanical Engineering

19UME604 - Mechatronics

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Material Used in K Type Thermocouple are CO1- U

   (a) Chromel/aluminum (d) Iron / Constantan

   (c) Chromel/Constantan (d) Copper / Constantan

2. What is the Resolution of Absolute Encoder, if it has 8 Tracks CO1- U

   (a) 1.406 Degree (b) 2.05 Degree (c) 45 Degree (d) 90 Degree

3. Which element is used to converts hydraulic power into Mechanical Power CO1- U

   (a) Compressor (b) Pump (c) Actuator (d) Convertors

4. ------- is Used to avoid the damage of Compressor due to excess pressure raise in pneumatic system CO1- U

   (a) DC Valve (b) Pressure Relief Valve

   (c) Flow Control Valve (d) All of the above

5. Select the Universal Gate CO1- U

   (a) NAND and NOR (b) AND and OR

   (c) NOT and AND (d) None of the above

6. Choose the correct binary Equivalent number for the decimal Number – 53.625 CO1- U

   (a) $(110101.1010)_2$ (b) $(111101.1010)_2$ (c) $(110001.1010)_2$ (d) $(100101.1010)_2$

7. The PLC is used in _____. CO1- U

(a) Machine tools (b) automated assembly equipment

(c) moulding and extrusion machines (d) all of the above

8. The acronym PLC stands for: CO1- U

(a) Pressure Load Control (b) Programmable Logic Controller

(c) Pneumatic Logic Capstan (d) Pressure Loss Chamber

9. In the level of integration of Mechatronics system, an example of the first level is ____ CO1- U

(a) Fluid valves (b) Automatic machine tools

(c) Industrial robots (d) Microprocessors

10. Which sensor is used in engine management system to measure burned exhaust gas CO5- U

(a) Oxygen sensor (b) temperature sensor

(a) speed sensor (d) Hall effect sensor

PART – B (5 x 2= 10 Marks)

11. Explain Inverse Piezoelectric Effect with Examples CO1- U

12. Outline the symbol of SCR Neatly CO1- U

13. Illustrate some properties of Boolean algebra CO1- U

14. Explain ON Delay and OFF delay timer with ladder diagrams CO1- U

15. Outline the function of Oxygen sensor in Engine Management system CO1- U

PART – C (5 x 16= 80 Marks)

16. (a) Outline briefly about Piezoelectric Sensor & Hall Effect Sensors CO1- U (16)

Or

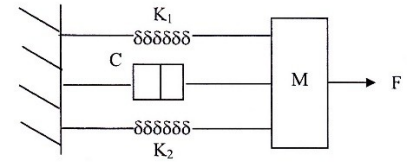
(b) Illustrate the building blocks of a Mechatronic System, indicating various modules involved in it & Explain Types of Mechatronics System CO1- U (16)

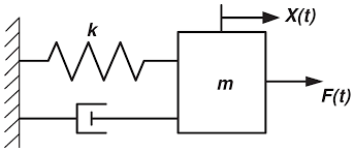
17. (a) Outline the 2/2, 3/2, 4/2, & 4/3 Direction Control Valve Construction & Working Neatly CO2- U (16)

Or

(b) Illustrate the Stepper Motor Definition Clearly & Explain the working of Various types of Stepper Motor with Neat Sketch CO2- U (16)

18. (a) Apply the Concept of Basic System Model & Derive the Differential Equation for the following Mechanical System — CO3- App — (16)





Or

(b) Apply the Concept of Basic System Model of Electrical system & Do the mess analysis for RL system, RC system, RLC system — CO3- App — (16)

19. (a) Examine a PLC ladder logic diagram for the application stated below. — CO4- App — (16)

There are three mixing devices on a processing lines A,B,C after the process begins. Mixer A is to start, after 7 sec is elapsed, next Mixer B is to start, 3.6sec after A. Mixer C is to start 5sec after B all remains ON until a Master enable switch is turned OFF.

Or

(b) Examine a PLC ladder logic diagram for the application stated below — CO4- App — (16)

A motor and its lubricating pump motor are both running. Lubrication for main motor bearings is required during motor coast down time. After the main motor is shut off the lubricating pump remains ON for a time corresponding to coast down time of 20 sec

20. (a) Design a pick and place robot using mechatronics elements and explain the Robot control. — CO6- C — (16)

Or

(b) Construct the various stages in designing a mechatronics system — CO2- App — (16)