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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023**

Semester : Semester VI - 2020

Course Code : MEC3083

Course Name : Sem VI - MEC3083 - Mechatronics

Program : MEC

Date : 9-JUN-2023

Time : 9.30AM - 12.30PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.*
 - (ii) Question paper consists of 3 parts.*
 - (iii) Scientific and non-programmable calculator are permitted.*
 - (iv) Do not write any information on the question paper other than Roll Number.*
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PART A

ANSWER ALL THE QUESTIONS

(10 X 2 = 20M)

1. Draw the truth table of NAND. (CO4) [Knowledge]
2. What is the purpose of a NOT gate in digital logic circuits? (CO4) [Knowledge]
3. What are the different types of Actuators? (CO3) [Knowledge]
4. Out of (Control Element/ Correction unit/ Display unit) is/are not an element of closed loop control system and why? (CO1) [Knowledge]
5. Draw the truth table of XOR. (CO4) [Knowledge]
6. Which (Primary/ Secondary/ Tertiary/ Quaternary) level of mechatronics Is also known as "Smart System"? (CO2) [Knowledge]
7. What are the application of Pnematic Actuators? (CO3) [Knowledge]
8. Electrically controlled relay is an example of _____ level Mechatronics. (CO2) [Knowledge]
9. Is the Generator an electro-mechanical device? Give your reason accordingly. (CO1) [Knowledge]

10. What are the disadvantages of Electrical Actuators?

(CO3) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(5 X 10 = 50M)

11. How can you get the sequence A+ B+A- B- using Pneumatic Actuator? Draw a neat and clean diagram and explain.

(CO3) [Comprehension]

12. Parking sensors in the cars are used to measure the distance of the car from an object. Name any two types of sensors which can be used for this process and explain the working of any one sensor mentioned above.

(CO2) [Comprehension]

13. How does an induction motor work, and what is the significance of rotor slip in its operation?

(CO4) [Comprehension]

14. Explain the concept of feedback in mechatronics, and discuss the different types of feedback used in mechatronic systems, including positive and negative feedback.

(CO1) [Comprehension]

15. Explain the operating principle of a brushless DC (BLDC) motor and how it differs from a brushed DC motor.

(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 15 = 30M)

16. How can you use relays to sequence A+ B+ C+ A- B- C-? Draw a neat and clean diagram and explain.

(CO3) [Application]

17. Using Boolean identities, reduce the given Boolean expression:

1. $F(X, Y, Z) = X'Y + YZ' + YZ + XY'Z'$

2. $F(X, Y, Z) = X'Y'Z + YZ + XZ$

3. $F(X, Y, Z) = XY + X(Y+Z) + Y(Y+Z)$

(CO4) [Application]