**B.E. DEGREE EXAMINATIONS: NOVEMBER 2009**

Second Semester

**MECHATRONICS ENGINEERING**

U07MH201: Fundamentals of Mechatronics Engineering

**Time: Three Hours**                                         **Maximum Marks: 100**

**Answer ALL the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. A change in process to change the control is

    a) Process signal      b) Control signal        c) Correction signal      d)  Error signal

2. The range of input values for which there is no output is

    a) Range                b) Span              c) Sensitivity                    d) Dead Band

3. A Small electrical switch which requires physical contact

    a) Pneumatic Switch      b) Non – proximity switch      c) Reed switch      d) Micro switch

4. Grash of condition is used in

    a) Kinematic Chain          b) Four bar chain        c) Slider crank chain    d) Gear train

5. Which of the following is a snubber circuit?

    a) 

    b) 

    c) 

    d) 
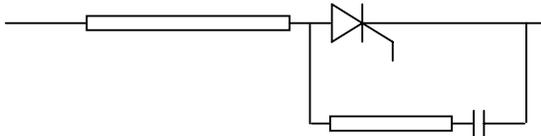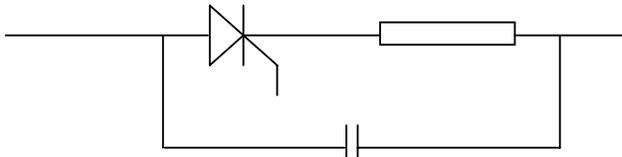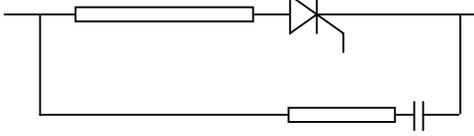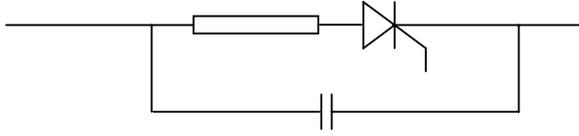
6. When a current is paused through the coil with a field it causes the coil,

    a) Attraction            b) Rotation        c) Deviation              d) Translation

7. Programming in PLC is concerned with

    a) Sequence switching   b) Logic Sequence   c)Logical Switching   d) Programmed sequence

8. Which one of the following a self maintaining circuit

    a) Latch                  b) Register          c) Relay                d) Timer

9. In a washing machine which of the following control is used

   a) Process control    b) Variable control    c) Automatic control    d) Sequential control

10. The control mode acting as a switch

   a) Two step mode    b) Proportional mode    c) Derivative mode    d) Integral mode

## PART B (10 x 2 = 20 Marks)

11. What are the key elements in Mechatronics?

12. Write the principle involved in Hall Effect Sensor?

13. Define repeatability, Reproducibility.

14. Write a note on moment of inertia in motor selection?

15. Define a PLC unit.

16. What are the types of direction control valves?

17. What is an artificial neural network?

18. Draw the Ladder logic diagram for NOR and XOR system.

19. Define linearity.

20. What is a tactile sensor?

## PART C (5 x 14 = 70 Marks)

21. (a) i) What are all the stages in designing a Mechatronics system.            (10)

   ii) Define Debouncing technique.                                               (4)

### (OR)

   (b) i) Explain the basic elements of a closed loop control system with the help of block diagram.   (10)

   ii) Discuss the Mechatronics approach to mechanical system with an example.    (4)


22. (a) Explain the following terms
                 i) Sensitivity                                                   (3)

                 ii) Hysteriss error                                              (3)

                 iii) Stability                                                   (3)

                 iv) Resolution                                                   (3)

                 v) Output Impedance                                              (2)

### (OR)

   (b) Explain the working principle of following sensor

                 i) Piezo electric Sensor        ii) Thermocouples               (7+7)


23. (a) Write short notes on.
                 i) Sampling                                                      (4)
                 ii) Quantization                                                 (4)
                 iii) Sequential controllers                                      (6)

### (OR)

   (b) Sketch the basic architecture of PLC and explain the function of each element.

24. (a) (i) Explain the specifications and operations of stepper motor in detail. (10)

     (ii) Define a simple slider crank mechanism. (4)

**(OR)**

 (b) Define

     (i) Proximity Switch (4)

     (ii) Pneumatic switch (4)

     (iii) Optical encoder (6)

25. (a) i) Write a brief note on online quality monitoring system. (7)

     ii) Define the supervisory control in inspection process (7)

**(OR)**

 (b) Draw and explain the 3 Axis pick and place robot with a Microcontroller to control the valves.

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