KUMARAGURU
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Register Number: ………………..

B.E DEGREE EXAMINATIONS: APRIL 2015

(Regulation 2009)

Seventh Semester

MECHANICAL ENGINEERING

MEC123**:** Mechatronics

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. A good example for standalone Mechatronics system is

    a) Washing machine
    b) Wire aircraft
    c) CIM
    d) Humanoid robot

2. The anti-lock brakes on a car are a simple example of

    a) Open loop system
    a) Real time system
    c) Closed loop system
    c) Sequential control system

3. A variable reluctance stepper motor is constructed of .... material with salient poles.

    a) Paramagnetic
    a) Ferromagnetic
    c) Nonmagnetic
    c) Diamagnetic

4. If a hybrid stepper motor has a rotor pitch of 36º and a step angle of 9º, the number of its phases must be

    a) 4
    b) 2
    c) 3
    d) 6

5. In a proportional temperature controller, if the quantity under the heater increases the offset will

    a) Increase
    b) Reduce
    c) Remain unaffected
    d) Both a and b

6. Which of the following system provides excellent transient and steady state response

    a) Proportional action
    b) Proportional + Integral action
    c) Proportional + Differential action
    d) Proportional + Integral + Differential action

7. Solenoids, lamps, motors are connected to:

    a) Analog input
    b) Analog output
    c) Digital input
    d) Digital output

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8. Which one of the following is not a PLC manufacturer

   a) Microsoft   b) ABB

   c) Mitsubishi   d) Siemens

9. The type of drive suitable for high torque application is

   a) Pneumatic   b) Electric

   c) Hydraulic   d) vector

10. The width of BASIS sensor used in CANON Auto focus Camera is

    a) 30mm   b) 30nm

    c) 20nm   d) 20mm

PART B (10 x 2 = 20 Marks)

11. What are the basic elements of a measurement system and sketch its block diagram?

12. What are the terms that define the performance of the transducers?

13. State the purpose of providing air dryers.

14. Why sequential valves are necessary in pneumatic system?

15. Define Hydraulic resistance.

16. List the basic elements used for modeling mechanical rotational system?

17. What are the advantages of PLC over a relay control system?

18. Draw the ladder diagram of NO and NC contacts.

19. Identify the role of opto-isolator in robot control.

20. Suggest a simple Mechatronics design for the flow control in a large pipe.

PART C (5 x 14 = 70 Marks)

21. a) Identify the various elements of a closed loop system in automatic water level controller and describe their functions.

    (OR)

    b) Explain the working principle of LVDT and Hall Effect sensor.

22. a) Describe various types of CAMS and Gear trains.

    (OR)

    b) What is a Stepper Motor? List its types & specifications and explain any one in detail.

23. a) Discuss briefly the following controllers

i) PI controllers (ii) PD controllers (iii) PID controllers

(OR)

b)   Explain in detail about adaptive control system and its stages of operation.

24. a)   Explain the basic architecture of PLC and detail about the PLC programming.

(OR)

b) i)   What are counters? Explain the different types of counters.   (8)

     ii)   Explain the factors considered for the selection of a PLC?   (6)

25. a)   Compare and contrast Mechatronics approach with traditional approach. Give suitable examples.

(OR)

b)   Design an Engine Management system for a vehicle and discuss its parameter for controlling the performance in all terms.

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