KUMARAGURU
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Register Number: ……..

B.TECH DEGREE EXAMINATIONS: DEC 2014

(Regulation 2009)

Third Semester

TEXTILE TECHNOLOGY

EEE252: Instrumentation and Control Systems

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

Answer all the Questions

PART A (10 x 1 = 10 Marks)

1. An example of active transducer

   a) Piezoelectric b) LVDT

   c) Potentiometer d) RTD

2. ------ error occurs due to inherent short comings and misuse of instruments

   a) Observational error b) Instrumental error

   c) Limiting error d) Environmental error

3. What pressure will be created by a column of liquid 6 m height if the weight density is 1250 kg/m^3?

   a) 7500 kg/m^2 b) 208 kg/m^2

   c) 73500 kg/m^2 d) 8500 kg/m^2

4. The emf (mV) of a thermocouple maintained at two junctions at different temperature is as follows

Hot (^{0}C)	Cold (^{0}C)	emf (mV)
1000	0	41.32
30	0	1.2
1000	30	?

   a) 41.32 b) 21.26

   c) 42.56 d) 40.12

5. Four strain gauges are formed into bridge with only one active gauge. The nominal resistance of all of them is 120 Ω. The gauge factor is 2.1 and the supply voltage is 10 V. Calculate the strain when the output from the bridge is 20 mV

a) 2.412×10^{-3} b) 1.5×10^{-3}

c) 3.825×10^{-3} d) 4.5×10^{-3}

6. Calculate the resistance of a copper wire 5 m long and 0.3 mm diameter. The resistivity is 1.7×10^{-8} Ohm metre

a) 2.5 b) 1.28

c) 1.202 d) 3.78

7. With a negative feedback, the system gain and stability

a) Decreases, increases b) Increases, decreases

c) Increases, increases d) Decreases, decreases

8. Feedback control system is basically

a) High pass filter b) Band pass filter

c) Low pass filter d) Band stop filter

9. The Laplace transform of a unit step function is

a) 1/s b) 1

c) s d) $1/s^2$

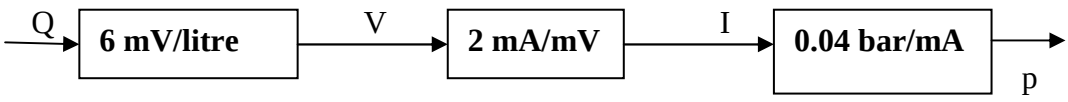
10. The number of sign changes in the entries in the first column of Routh's array denotes

a) Number of roots of the characteristics polynomial in RHP b) Number of open loop poles in RHP

c) Number of zeros of the system in RHP d) Number of open loop zeros in RHP

PART B (10 x 2 = 20 Marks)

11. What are the functional elements present in the measurement system?
12. Differentiate the Accuracy from Precision.
13. The block diagram shows how a flow measuring system works. The input is flow rate in litres/sec and the output is air pressure in bars. Calculate the output of the system in bar when the input is 1.5 litres/s



14. Write the relationship between kinematic viscosity and dynamic viscosity.
15. Define Gauge factor.
16. A force of 5000 N acts on an area of 400 mm2. Calculate the pressure in Pascals.
17. Compare open loop and closed loop system
18. Write the steps to formulate the Mathematical model.
19. What is settling time?
20. State the sufficient condition for stability.

PART C (5 x 14 = 70 Marks)

21. a) (i) Classify the errors depends on sources and explain the way to reduce these errors. (7)

(ii) A 0-10A ammeter has a guaranteed accuracy of 1.5 % of full scale reading. The current measured by the instrument is 2.5 A. Calculate the limiting values of current and the percentage limiting error (7)

(OR)

b) Describe the construction and working principle of displacement measurement using variable reluctance type transducer.

22. a) Explain the construction and working principle of C- type bourdon gauge used for medium range of pressure measurement.

(OR)

b) (i) How Faraday's law can be used to measure the flow rate of conductive fluid without any obstruction in the flow path. Explain with neat diagram. (10)

(ii) Describe the procedure of measuring the relative humidity in Industries using sling psychrometer. (4)

23. a) Describe the measurement method of force using hydraulic and pneumatic load cells with neat diagram.

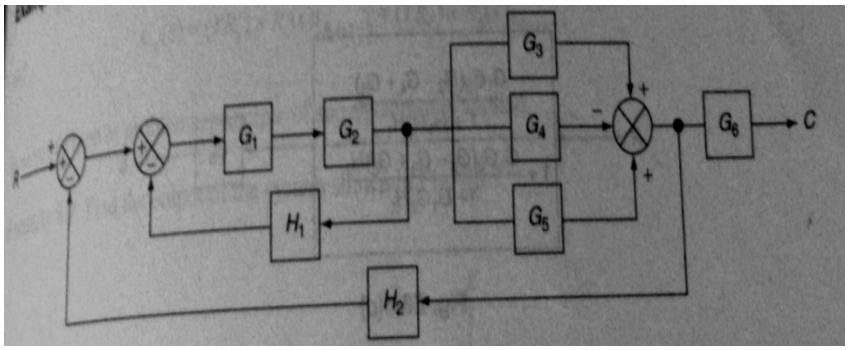
(OR)

b) Describe how to eliminate temperature error in a strain gauge bridge when it has

(i) One active gauge.

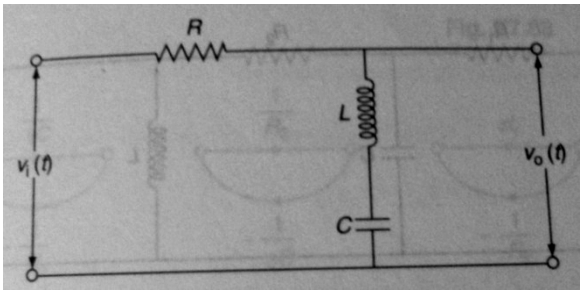
(ii) Two active gauges.

24. a) Find the single block equivalent of given Figure



(OR)

b) Find the transfer function of the network shown in Figure using Mason's gain formula.



25. a) Derive the step and ramp response of the first order system.

(OR)

b) Determine the range of values of K so that the system having the following characteristics equation will be stable.

$S(S^2 + 2S + 3)(S + 2) + K = 0$

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