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May 2007

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J-1502[6415 B]

[2957]

B.Tech. (Semester - 3rd)

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (EC - 203)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 x 2 = 20)*

a) What are instrument transformers? How do they differ from power transformers.

b) Why Ratio and phase angle errors are important in case of a current transformer?

c) Why are electronic instruments becoming more and more popular as compared to electrical instruments?

d) What is the purpose of triggering circuit in CRO.

e) Differentiate between Square Wave Generators and Pulse Generators.

f) What is meant by Harmonic Distortion?

g) Why are Strain Gauges called peizoresistive strain gauges?

h) Why piezoelectric transducers cannot be used for static displacement measurements?

i) What is difference between dc and ac telemetring systems?

j) What is Multiplexing?

Section - B

(4 x 5 = 20)

Q2) Draw the block diagram of a typical Telemetry System and explain the function of each component.

Q3) Describe the principle of Nixie Tubes.

P.T.O.

Q4) An LVDT is used for measuring the deflection of Bellows. The Sensitivity of LVDT is 40 V/mm. The Bellows is deflected by 0.125 mm by a pressure of 0.8×10^6 N/m^2 .Determine the sensitivity of LVDT in V per N/m^2 and the pressure when the voltage output of LVDT is 3.5 V.

Q5) A strain gauge having a resistance of 200 Ω and gauge factor 2.5 is connected in series with a blast resistance of 400 Ω. The total voltage across the combination is 24 V. Determine the change in the output voltage when a stress of 140 N/m^2 is applied. The Modulus of Elasticity is 200 GN/m^2.

Q6) Explain the function of basic type of Strip Chart Recorder. Explain the different types of marking mechanisms used in it.

Section - C

(2 x 10 = 20)

Q7) Why is an electronic voltmeter more accurate than an ordinary voltmeter? Draw its block diagram and explain the principle of operation.

Q8) (a) A current transformer with a nominal ratio of 1000/5 amperes has a bar primary. The magnetising and iron loss components are each 1.5% of the full load primary current. Determine the ratio and phase angle errors when the secondary carries a current of 5A lagging behind the secondary induced voltage by 30°.

(b) Derive the expressions of ratio and phase angle error of potential transformers.

Q9) (a) Determine the percentage error in Q measurement introduced by 0.02 Ω insertion resistance. The resonating capacitor is 135 pF and oscillating frequency at resonance is 3 MHz. The Resistance of the coil is 10 Ω.

(b) Explain the working of a Spectrum Analyzer with the help of a block diagram.