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Total No. of Questions : 09]

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Paper ID [A0302]

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B.Tech. (Sem. - 3rd)

ELECTRONICS MEASUREMENTS & 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 × 2 = 20)

- a) What is full name of VTVM?
- b) How CRO is used for measurement of electrical quantities?
- c) Name main components of a cathode ray tube (CRT).
- d) Name various applications of a wave analyzer.
- e) How is harmonic distortion or distortion factor defined? Name some methods used to measure harmonic distortion.
- f) Why are CT and PT called instrument transformers?
- g) Define a transducer and distinguish between a sensor and a transducer.
- h) What is an LVDT? What quantities can be measured by using LVDT?
- i) Enumerate main elements of a digital data-acquisition system.
- j) Give various types and applications of telemetry systems.

Section - B

(4 × 5 = 20)

Q2) Discuss working of a basic Q-meter. A coil with a resistance of $10\ \Omega$ is connected in the 'direct measurement' mode. Resonance occurs when the oscillator frequency is 1×10^6 Hz and the resonating capacitor is set at 60PF. Calculate the % error introduced in obtaining Q-value by $0.02\ \Omega$ insertion resistance.

- Q3)** Discuss working of Maxwell's bridge for measurement of inductance. For what range of Q-factor of the coil, the bridge is suitable?
- Q4)** Discuss working of a wave analyzer using heterodyning principle. Also list applications of the wave analyzer.
- Q5)** Give classification of transducers. Why is strain gauge is a passive transducer? Define sensitivity of strain gauge. A resistance strain gauge has Gauge factor of 2 and is fastened to a steel member subjected to a stress of 1050 kg/cm^2 . Modulus of elasticity of steel is $2.1 \times 10^6 \text{ kg/cm}^2$. Calculate the change of resistance, ΔR of the strain gauge.
- Q6)** What is meant by data acquisition system (DAS)? What are its categories and main elements? Discuss working of a magnetic tape recorder used in DAS.

Section - C

(2 × 10 = 20)

- Q7)** (a) Explain the working principle of current transformers (CT). What will happen if the secondary circuit of the CT is open circuited while primary carries current?
- (b) An 8/1-CT has accurate current ratio when the secondary is short circuited. The inductance of the secondary is 60 mH and resistance is 0.15Ω with frequency 50 Hz. Estimate the CT-ratio and phase angle error when the instrument load has resistance and inductance of 0.4Ω and 0.70 mH respectively. Assume no iron loss and magnetising current equal to 1% of the primary current.
- Q8)** (a) With the help of schematics introduce a typical telemetering system and present functioning each element block.
- (b) Discuss various types of Telemetry systems and explain the method of data transmission over the channel link of the system.
- Q9)** Write short notes on :
- (a) Applications of Telemetering system.
- (b) Photoelectric transducers.
- (c) LCR-meter and its uses.

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