

Total number of printed pages – 7 **B. Tech**
CPEC 5303

Sixth Semester Examination – 2008

ELECTRONICS MEASUREMENT AND MEASURING INSTRUMENTS

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*

1. Answer the following questions : 2 × 10
- (a) A moving coil ammeter has a uniform scale with 50 divisions and gives full scale reading of 5 A. Determine the resolution of the instrument in mA.



- (b) For measurement of very Low Resistance which type of bridge circuit is used and why ?
- (c) What are the factors taken into consideration while selecting an electronic type voltmeter ?
- (d) In Voltmeter why ac sensitivity is always less than dc sensitivity ?
- (e) Draw the Lissajous pattern with two equal voltage of equal frequency and
- (i) 45° phase shift
- (ii) 150° phase shift.
- (f) The deflection sensitivity of Cathode ray tube is 0.06 mm/V and unknown voltage applied to the deflection plate shifts the

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spot by 4 mm towards the left in the horizontal direction. Determine the unknown applied voltage.

(g) What are the materials used for Strain gauge ? Give their merits and demerits.

(h) Which type of Transducers are used as Displacement Transducer and give their application.

(i) What do you mean by ± 1 count error for a frequency counter ?

(j) Determine the frequency of Oscillation in a Wien's bridge circuit where

$$R_1 = R_2 = 6 \text{ K}\Omega$$

$$C_1 = C_2 = C = 3 \text{ nF}$$

$$R_3 = 12 \text{ K}\Omega, R_4 = 6 \text{ K}\Omega$$

2. (a) With the neat circuit diagram explain the working of Average Reading AC voltmeter.

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(b) Define the term "Reliability" and "Validity" and explain with suitable example. 4

3. (a) Derive the equation of balance of a Schering bridge. Draw the phasor diagram under null condition and explain how loss angle of capacitor can be calculated.

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(b) An insulating specimen is connected in the arm AB of a Schering bridge. The other three arms of the bridge are as follows :

Arm BC 100Ω (non-inductive) and CD

309 Ω (non-inductive) in parallel with a capacitance of 0.5 μF (loss free); and arm DA 100 $\mu\mu\text{F}$ capacitor (loss free) calculate capacitance equivalent series resistance and loss angle of the specimen if the bridge is excited by 50 Hz supply connected across AC. 4

4. Describe the functions of the essential components of a CRO with the help of block diagram. How would you use CRO to measure phase difference of two sinusoidal signals. 10

5. What is a signal generator ? How does it differ from an ordinary oscillator ? Draw the block diagram of an AM signal generator and explain it. 10

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6. (a) With the help of block diagram explain the working of a Spectrum analyzer. 7

(b) Draw the block diagram of a Conventional Frequency Counter. 3

7. (a) Define gauge factor of a Strain gauge. How does temperature effect the operating characteristics of Strain gauge ? How it is compensated ? 6

(b) A resistance strain gauge is used to measure stress on steel. The steel is stressed to 1200 kgf/cm². Assume Young Modulus of steel 2×10^6 kgf/cm². Determine the percentage change of resistance of a strain gauge assuming gauge factor equal to 2.5. 4

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8. (a) Write short notes on (any two) : 5×2

(a) Data Acquisition system

(b) Isolation Amplifier

(c) True-rms reading voltmeter.
