

Faculty of Engineering & Technology
 Third Semester B.E. (Electronic/E.T./E.C.) (C.B.S.)

Examination

**ELECTRONICS MEASUREMENT AND
 INSTRUMENTATION**

Time—Three Hours]

[Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
- (2) Answer SIX questions.
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Assume suitable data wherever necessary.
- (5) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) Explain generalized instrumentation system with block diagram with suitable example.

(b) A circuit was tuned for resonance by eight different trainee engineers and the value of resonant frequency in kHz were recorded as 532, 548, 543, 535, 546, 531, 543 and 536. Calculate :

- (i) Arithmetic Mean 539.25
- (ii) Average Deviation 5.75
- (iii) Deviation from mean
- (iv) Std. deviation 6.74

(v) Variance 42.33

(vi) Range. 17

7

OR

2. (a) What are different types of Errors ? Give its classification and explain how it can be minimised.

7

(b) A voltmeter reading 70V on its 100V range and ammeter reading 80 mA on its 50 mA range are used to determine the power dissipated in a resistor both these instruments are guaranteed to be accurate within $\pm 5\%$ of full scale deflection. Determine the limiting error of the Power.

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3. (a) Explain the working of a PMMC galvanometer. Give the equation of control torque.

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(b) A moving coil instrument gives a full scale deflection of 10 mA when the Potential difference across its terminals is 100 mV Calculate (i) The shunt resistance for a full scale deflection corresponding to 100 A. (ii) The series resistance for full scale reading with 1000 V. Calculate the Power dissipation in each case.

7

OR

4. (a) Explain working of True rms responding Voltmeter.

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(b) A PMMC instrument has a coil of dimensions 15 mm \times 12 mm. The flux density in the air gap is

$1.8 \times 10^3 \text{ Wb/m}^2$ and the spring constant is $0.14 \times 10^{-6} \text{ N-m/rad}$. Determine the number of turns required to produce an angular deflection of 90° when a current of 5 mA is flowing through the coil. 7

5. (a) What do you mean by low, medium and high resistance? Describe Kelvin's double bridge method for low resistance measurement and obtain the condition of balance. 7

(b) For the Hays bridge $R_1 = 500 \Omega$, $L_1 = 0.18 \text{ H}$, $R_3 = R_2 = 1000 \Omega$. Find the values of R_4 and C_4 . If the supply voltage and angular frequency is 5V and 5000 rad/sec. Draw the phasor diagram. 6

OR

6. (a) Derive equation of balance of Maxwell's bridge along with phasor diagram. 6

(b) A sample of bakelite is tested by schering bridge at 25 kV, 50 Hz. The balance is obtained with a standard capacitor of $106 \mu\text{F}$, a condenser of $0.4 \mu\text{F}$ in parallel with non-inductive resistor of 318Ω and a noninductive resistor of 120Ω . Determine the capacitance, the equivalent series resistance and the dissipation factor of the Specimen. Draw the phasor diagram and prove the relationship used in the bridge. 7

7. (a) Define following :

(i) Accuracy

(ii) Precision

(iii) Resolution

(iv) Threshold

(v) Sensitivity

(vi) Linearity

(vii) Hysteresis

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(b) Derive expression for output voltage in Piezoelectric transducer $E_0 = g \times t \times p$.

7

OR

8. (a) Derive expression for Gauge Factor of Strain gauge.

7

(b) What are different types of flow measuring devices and explain Electromagnetic flowmeter.

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9. (a) Explain working of General Purpose CRO with the help of block diagram.

6

(b) Explain dual beam and dual trace CRO.

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OR

10. (a) What is Digital Storage Oscilloscope ? Draw the block diagram and explain function of each block.

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(b) A CRT has an anode voltage of 2000 V and parallel deflecting plates 2 cm long and 5 mm apart. The

screen is 30 cm from the centre of the plate. Find the input voltage required to deflect the beam through 3 cm. The input voltage is applied to the deflecting plates through amplifiers having an overall gain of 100. 6

11. (a) What is the necessity of Signal Conditioning ? Explain AC Signal Conditioning system with block diagram. 7
- (b) Explain working of Data Acquisition System. 6

OR

12. (a) Explain Harmonic Distortion Analyzers. 6
- (b) Draw and explain block diagram of Spectrum Analyzer and give the applications of Spectrum Analyzer. 7