

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS

IV-B.TECH-I-Semester End Examinations (Supply) - December- 2025
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Common for ECE, CSE)

[Time: 3 Hours]

[Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(20 Marks)

1. a) Define the terms Accuracy and Precision. [2M]
- b) Find the multiplying power of shunt of 200Ω resistance used with galvanometer of 1000Ω resistance. Determine the value of shunt resistance to give a multiplying power of 50. [2M]
- c) Formulate an equation for the measured value of total harmonic distortion. [2M]
- d) Where are spectrum analyzers commonly used? [2M]
- e) An electrically deflected CRT has a final anode voltage of 2000V and parallel deflecting plates 1.5cm long and 5 mm apart .If the screen is 50 cm from the centre of deflecting plates, Find the deflection sensitivity and the deflection factor of the tube. [2M]
- f) Why is a delay line important in a CRO? [2M]
- g) What is a Transducer? Give the classification of transducers. [2M]
- h) A resistance wire strain gauge uses a soft iron wire of small diameter .The gauge factor is +4.2. Neglecting the piezoresistive effects, Calculate the poisson's ratio. [2M]
- i) What resistance range must resistor R_3 have in order to measure unknown resistor in the range 1-100K Ω using a Wheatstone bridge. Given $R_1=1K\Omega$ and $R_2=10K\Omega$. [2M]
- j) Explain any three objectives of a Data Acquisition System. [2M]

PART-B

(50 Marks)

- 2.a) Explain the working of a basic DC voltmeter. How can its range be extended. [5M]
- b) Calculate the value of multiplier resistance on the 50V range of a dc voltmeter that uses a $200\mu\text{A}$ meter movement with an internal resistance of 100Ω . [5M]

OR

- 3.a) Explain the different types of errors in measurement in detail. [5M]
- b) A 100Ω basic movement is to be used as an ohmmeter requiring a full-scale deflection of 1mA and internal battery voltage of 3V. A half-scale deflection marking of 2K is desired. Calculate (i) Values of R_1 and R_2 (ii) maximum value of R_2 to compensate for a 5% drop in battery voltage. [5M]
4. Describe the circuits and working of wave analyzers used for audio frequency and megahertz range. [10M]

OR

5. What is Heterodyning and explain the use of Heterodyning in spectrum analyzer along with its circuit diagram. [10M]

6. Draw the circuit diagram of Sampling oscilloscope and explain its operation in detail. [10M]

OR

7. A CRT has an anode voltage of 2000V and parallel deflecting plates 2 cm long and 5mm apart. The screen is 30 cm from the centre of the Plates .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. [10M]

8. What is Piezo-electric effect? Explain the working principle of Piezo electric transducer in detail. [10M]

OR

9.a) Explain the working of resistance thermometer in detail. [5M]

b) A platinum thermometer has a resistance of 100Ω at 25°C (a) Find its resistance at 65°C if the platinum has a resistance temperature co-efficient of $0.00392/\text{ }^\circ\text{C}$ (b) If the thermometer has a resistance of 150Ω , Calculate the temperature. [5M]

10. Explain the operation of Maxwell's Bridge and derive the condition for balance of a Bridge. [10M]

OR

11. Define and explain about Absolute humidity, Relative humidity, Specific humidity. [10M]
Elaborate how humidity is measured.
