

Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

[Total No. of Questions: 09]

EVENING

[Total No. of Pages: 02]

Uni. Roll No.

03 JAN 2023

Program: B.Tech. EE (Sem. 5th)

MEASUREMENT and INSTRUMENTATION

Subject Code: PCEE-112

Paper ID:16464

Scientific Calculator is allowed

Time Allowed: 03 Hours

Max. Marks: 60

Note:

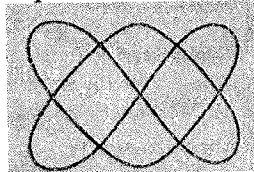
- 1) Parts A and B are compulsory
- 2) Part C has two questions Q8 and Q9. Both are compulsory, but with internal choice.
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) State difference between accuracy and precision.
- b) "Secondary terminal of the C.T. must not be left Open Circuited (O.C.)". Justify
- c) Draw the fully labeled diagram depicting hysteresis effect for input/output relationship for a given instrument.
- d) State any four components of a typical analog Data Acquisition System.
- e) Draw the circuit diagram showing Galvanometer to be used as an ammeter?
- f) Calculate the ratio of vertical to horizontal frequencies for an oscilloscope which displays the following Lissajous pattern



Part – B

[Marks: 04 each]

- Q2. With a suitable diagram differentiate between moving coil and moving iron instrument?
- Q3. State full form of LVDT? With suitable diagram explain its principle working and operation. State one application.
- Q4. Illustrate any four different types of sensors used for measuring temperature. Describe any one with principle of operating, construction. Also, mention its one application.
- Q5. Draw Maxwell's inductance bridge with phasor diagram for measurement of unknown capacitance. This bridge is limited to measurement of low Q coils ($1 < Q < 10$). Justify.

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Q6. An energy meter is designed to make 100 revolutions of disc for one unit (1 kWh) of energy. Calculate the number of revolutions made by it when connected to load carrying 20A at 230V r.m.s and 0.6 power factor for an hour. If it actually makes 280 revolutions, find the percentage error.

Q7. Diagrammatically state the principle of Hall effect transducer. A Hall effect transducer is for measurement of a magnetic field of 1Wb/m^2 . The 1mm thick Bismuth slab is for which the Hall's co-efficient is $-1 \times 10^{-6} \text{Vm/(A-Wb-m}^{-2})$ and the current is 3A.

Part – C

[Marks: 12 each]

Q8. Draw the equivalent circuit and phasor diagram of a potential transformer. Derive the expressions for its ratio and phase angles.

OR

Draw the block diagram of Digital Storage Oscilloscope. How waveform reconstruction is done in DSO's?

Q9. Illustrate different types of strain gauges and their applications.

Two resistive type strain gauges are connected in wheatstone bridge arrangement. One of the gauge is installed on a test specimen and another one is installed on a piece of material and is not subjected to any strain. Draw the arrangement and also derive relation under balance conditions and change in other ambient conditions apart from change in strain. What is the name given to the strain gauge which is not subjected to strain and what is the purpose of using it? Justify

OR

Illustrate different types of control systems used in analog instruments and explain them in detail.

Why damping is required in analog instruments and also draw the setting curves for different types of damping?
