

Roll No.

Total Pages : 03

BT-4/M-20

34015

**ANALOG INSTRUMENTS &
MEASUREMENTS
EECT-206E**

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Explain the difference between limiting and known errors with the help of suitable examples. **10**
(b) Show that $\frac{1}{\sqrt{\mu\epsilon}}$ has the dimensions of velocity, where μ is permeability and ϵ is permittivity. **10**
2. (a) Explain the theory and working of an LED. Also describe its advantages. **8**
(b) Describe basic components of magnetic tape recorder used for instrument applications using direct recording techniques. Also describe its advantages and disadvantages. **12**

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Unit II

3. (a) Why electrostatic instrument cannot be used for measuring low voltages while electromagnetic instruments can be ? Illustrate your answer with some specific example. **10**
- (b) A dynamometer ammeter is fitted with two fixed coils having a total resistance of 0.3Ω and the total inductance of 0.12 H . And, a moving coil of resistance of 30Ω and the inductance of 0.003 H . Calculate the error in reading when the instrument is calibrated with dc and used on ac 50 Hz with moving coil shunted directly across the field coils. Comment upon the results. **10**
4. Write a short note on measurement of transmission line parameters. Also give its application. **20**

Unit III

5. (a) Derive the equations for balance in the case of Maxwell's inductance capacitance bridge. Draw the phasor diagram for balanced condition. **10**
- (b) The arms of a four arm bridge abcd, supplied with sinusoidal voltage, have the following values :
Arm ab : a resistance of 200Ω in parallel with a capacitance $1 \mu\text{F}$
Arm bc : 400Ω resistance

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Arm cd : 1000 Ω resistance

Arm da : a resistance R_2 in series with a 2 μ F capacitance.

Determine the value of R_2 and the frequency at which the bridge will balance. **10**

6. Describe, how high current and voltages are measured with the help of instrument transformers with illustrations through suitable diagrams. Also, describe the advantages of instrument transformers as regards extension of range of current and voltage on high voltage AC systems. **20**

Unit IV

7. (a) Explain purpose of multiplexer in a telemetry system. Also describe the equivalent system required at the receiver end of a telemetry system. **10**
- (b) What are different types of wired channels used in instrumentation ? Explain any *two* of them in detail giving its characteristics and specific applications of each. **10**
8. (a) Describe construction, working and theory of an electromagnetic type flow meter. **10**
- (b) What are the methods to measure torque ? Describe any *one* of them in detail citing its setup and operating principle. **10**