

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, May 2019
B. Tech. in Electrical Engineering, Semester IV

Roll No.....

Course Code : EE303 Measurement and Instrumentation Time: 3.00 hours Max. Marks: 40

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Answer all questions
Part A – (6 × 1 = 6 marks)

1. What is the major cause of creeping error in an energy meter?
2. Why Maxwell Bridge is limited to the measurement of medium – Q coils?
3. Suggest a transducer for the measurement of displacement in the order of one – tenth of millimeter and write the basic principle of measurement.
4. What will happen in a current transformer, if the secondary circuit is accidentally opened while the primary winding is energized?
5. Why standardization needed before the use of the potentiometer? Describe the procedure of standardization of a dc potentiometer.
6. Which transducer is most suitable for measurement of boiler temperature?

Part B – (6 × 4 = 24 marks)

7. How many types of errors encountered in measurements? How these errors can be minimized?
8. Electrical machine laboratory has a moving coil instrument which gives a full scale deflection of 10mA, potential difference across its terminal is 100mV. Calculate
 - (a) Design given instrument to measure 10A current.
 - (b) Design given instrument to measure 600 V voltage.
 - (c) Calculate the power dissipation in each case.
9. A cable is tested by loss of charge method using a ballistic galvanometer, with following result: Discharged immediately after electrification, deflection 200 divisions. Discharged after 30 s and after electrification: (i) deflection 126 divisions, (ii) when a parallel with a resistance of 10 MΩ, deflection 100 divisions. Calculate the insulation resistance of the cable.
10. Why flash type ADC more preferred than dual slope type ADC. Design the flash type converter for convert analog signal into digital signal.

11. How do you measure the unknown capacitance using Schering Bridge? Draw the phasor diagram.

12. A bridge consists of following :

Arm ab – a choke coil having a resistance R_1 and inductance L_1 .

Arm bc – a non-inductive resistance R_3 .

Arm cd – a mica condenser C_4 in parallel with a non-inductive resistance R_4 .

Arm da - a non-inductive resistance R_2

When this bridge is fed from a source of 500 Hz, balance is obtained under following conditions. $R_2 = 2000 \text{ ohm}$, $R_3 = 700 \text{ ohm}$, $R_4 = 60 \text{ ohm}$ and $C_4 = 0.40 \mu\text{F}$. Calculate the resistance and inductance of choke coil.

OR

12. Why the Wagner earthing is needed? Where it is preferred? Explain the working operation with neat diagram of Wagner earthing.

Part C – (2 × 5 = 10 marks)

13. How dc potentiometer can calibrate following instruments:

(a) Voltmeter

(b) Ammeter

(c) Wattmeter

(d) Determination of an unknown resistance.

OR

13. A single range Crompton type potentiometer has 1 step dial switch where each step represents 0.1 V. The dial resistance are 10 ohm. The slide wire of potentiometer is circular and has 10 turns and a resistance of 10 ohm each. The slide wire has 100 divisions and interpolation can be done to one third of a division. The working battery has a voltage of 6.0 V and negligible internal resistance. Calculate

(a) The measuring range of the potentiometer (b) Resolution

(c) Working current (d) Setting of rheostat

14. A barium titanate pickup has the dimensions of $5 \text{ mm} \times 5 \text{ mm} \times 1.25 \text{ mm}$. The force acting on it 5 N. The charge sensitivity of barium tatanate is 150 pC/N and its permittivity is $12.5 \times 10^{-9} \text{ N/m}^2$, calculate the strain. Also calculate the charge and capacitance.