Roll No.....

National Institute of Technology Delhi

End Semester Examinations Nov 2019

Name of Specialization: Electrical & Electronics Engg Year: Second Semester: III

Course Name: Electrical & Electronic Measurements **Maximum Marks – 50**

Course Code: EEB-202 **Total Time: 3:00 Hours**

Note:

- All Questions are compulsory.
- Do not write irrelevant theory and draw neat waveforms and circuit diagrams.
- Assume data where ever required.

Section A (*All parts are compulsory*)

Q1) Explain clearly the difference between the term "Measurand" and "Measurement". (1)

Q2) What are Gross Errors? How can these be avoided? (1)

Q3) Explain clearly the difference between "Threshold" and "Resolution". (1)

Q4) The current passing through a resistor of $50\pm0.2\Omega$ is 4 ± 0.02 A. Determine the limiting error in the computed value of power dissipation. (1)

Q5) What is an "Error calibration curve" (1)

Q6) Draw the circuit diagram of Wien's Bridge with clearly defining each components (1)

Q7) The measured value of a capacitor is $205.3\mu F$, where as its true value is $201.4\mu F$. Determine the relative error. (1)

Q8) Determine the resolution of a moving coil voltmeter having a uniform scale with 50 division; the full scale reading is 50V and 1/10 of a scale division can be estimated with a fair degree of certainity? (1)

Q9) In a Kelvin double bridge, there is error due to mismatch between the ratios of outer and inner arm resistances. The following data relate to this bridge:

Standard resistance = $100.03\mu\Omega$; inner ratio arms = 100.31Ω and 200Ω; Outer ratio arms = 100.24Ω and 200Ω; The resistance of connecting leads from standard to unknown resistor is $680\mu\Omega$. Calculate the unknown resistance. (2)

Section B (*Any four (04) are to be attempted*)

Q10) Draw the neat diagram of Schering Bridge. Deduce the equations when the bridge is under balanced condition. Explain clearly how you can measure dissipation factor by using this bridge. Draw the phasor diagram of the voltages and currents of the bridge arms at balance. Discuss the advantages of this bridge. (5)

Q11) Three resistors have the following ratings:
$R_1 = 200\Omega \pm 5\%$, $R_2 = 100\Omega \pm 5\%$ & $R_3 = 50\Omega \pm 5\%$
Determine the magnitude of the resultant resistance and limiting errors in percentage and ohms, if the above resistances are connected in (a) Series & (b) Parallel (5)

Q12) The following readings were obtained during measurement of inductance of a coil on an AC potentiometer:
Voltage drop across 0.1Ω standard resistor connected in series with the coil = $0.163 < 12^\circ 6'$ V
Voltage across the test coil through a 100:1 volt ratio box = $0.781 < 50^\circ 48'$
Frequency = 50Hz. Determine the value of inductance of the coil. (5)

Q13) Draw and explain the circuit diagram & phasor diagram of a CT. (5)

Q14) The following results were obtained by loss of charge method of testing a cable:
Discharged immediately after charging, the deflection = 200 divisions
Discharged 30 seconds after charging, the deflection = 125 divisions
Discharged 30 seconds after charging,
When in parallel with a resistance of 10 MΩ, the deflection = 100 divisions, calculate insulation resistance of cable. (5)

Section C (Any two (02) are to be attempted)

Q15)(I) Draw a neat sketch of a modern D.C. potentiometer and bring out its salient features. Discuss how the potentiometer is standardized. (5)

Q15)(II) Describe with the help of suitable diagrams, how a DC potentiometer can be used for:
(i) Calibration of Voltmeter
(ii) Calibration of Wattmeter (5)

Q16) (I) Describe the Varley loop test for localization of grounds and short circuit faults in cables.(6)

(II) In a Murray loop test for earth fault on 400m of cable having a resistance of 1.5Ω/ km, the faulty cable is looped with a sound cable of the same length & area of cross section. If the ratio of the other two arms of the testing network at balance is 4:1, find the distance of the fault from the testing end of the cable. (4)

Q17) The emf of a standard cell used for standardization is 1.0183 volts. If the balance is obtained at a length of 55 cm, determine:
(a) The emf of the cell which balances at 70 cm.
(b) The current flowing through a standard resistance of 2Ω if the p.d. across it balances at 65 cm.
(c) The voltage of a supply main which is reduced by a volt-ratio box to one hundredth and balance is obtained at 85 cm.
(d) The percentage error in ammeter reading 0.35 ampere when balance is obtained at 45 cm with the p.d. across a 2.5Ω resistor in the ammeter circuit.
(e) The percentage error in a voltmeter reading 1.42 volts when balance is obtained at 75 cm. (10)