



Third Semester B.E. Degree Examination, Dec.2019/Jan.2020 Electrical and Electronic Measurement

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1.
 - a. Derive the balancing equation for Kelvin's double bridge. (08 Marks)
 - b. Explain how to measure earth resistance by using Megger. (06 Marks)
 - c. The energy stored in a parallel plate capacitor per unit volume is given by $W = K\epsilon^a V^b d^c$, where d = distance between the plates, V = voltage between the plates, ϵ = permittivity of the medium and K = constant. Find the values of a , b and c by dimensional analysis. (06 Marks)

OR

2.
 - a. Define the sensitivity of Wheatstone's bridge with the necessary circuit diagram. Hence deduce the expression for the sensitivity of the bridge 'SB'. (07 Marks)
 - b. The four arms of a Maxwell's inductance bridge consist of the following elements. Arm AB consists of an inductive coil of resistance r_1 and inductance L_1 in series with a variable resistance R_1 . Arms BC and CD consists of standard resistance of 100Ω each. Arm DA consists of a standard variable pure inductor L_2 and a variable resistance R_2 . Balance is obtained when $L_2 = 50.6$ mH, $R_1 = 2.4 \Omega$ and $R_2 = 42.4\Omega$. Find the resistance and inductance of the coil in the arm AB. The detector is connected between B and D. The supply is connected between A and C. (05 Marks)
 - c. Obtain the balance equation for Hay's bridge used for measurement of unknown inductance. Draw the phasor diagram at balance condition. (08 Marks)

Module-2

3.
 - a. Derive the torque equation of single phase electrodynamicometer type wattmeter. (08 Marks)
 - b. What are the errors and adjustments in dynamometer type wattmeter? (04 Marks)
 - c. Explain the working principle and construction of three phase electrodynamicometer power factor meter. (08 Marks)

OR

4.
 - a. With the help of neat sketch, explain the construction and working of Weston frequency meter. (08 Marks)
 - b. The name plate of a single phase energymeter reads as 250 V, 20 A, 1800 rev/KWH. The meter is tested at $3/4^{\text{th}}$ load and u.p.f. The meter makes 20 revolutions in 10 seconds. Determine the % error in the reading of energy meter. (06 Marks)
 - c. Explain in detail the errors and adjustments in single phase energy meters. (08 Marks)

Module-3

5.
 - a. Explain the operation of the comparative deflection method of testing a current transformer by Silsbee's method. (08 Marks)
 - b. What do you mean by shunts and multipliers and derive the expression for shunts and multipliers? (08 Marks)
 - c. Discuss the advantages of instrument transformers. (06 Marks)

110 JAN 2020

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain the measurement of magnetizing force by ballistic galvanometer and a search coil with a neat diagram. (08 Marks)
- b. The exciting current of a ring core current transformer of ratio 500/4 A is 2A at a power factor of 0.5, when operating at full primary current. If secondary burden is a non-inductive resistance of 2Ω , find: (i) Phase angle of the current transformer and (ii) Ration error at full load, assuming that there is no turns compensation. (06 Marks)
- c. Explain the measurement of flux/flux density using search coil. (08 Marks)

Module-4

- 7 a. Explain with the help of neat block diagram the function of integrating type digital voltmeter. (08 Marks)
- b. Explain the operation of true RMS reading voltmeter. (08 Marks)
- c. Write a note on performance parameters of digital voltmeter. (06 Marks)

OR

- 8 a. With a neat block diagram, explain the principle of working of electronic energy meter. List the drawback of traditional energy meter. (08 Marks)
- b. With a neat sketch explain the working of Q-meter. (06 Marks)
- c. With a neat sketch explain the working of electronic multimeter. (06 Marks)

Module-5

- 9 a. With a neat sketch, explain the working of the following and list its advantages and disadvantages:
 (i) Liquid Crystal Display (LCD)
 (ii) Nixie tube display (12 Marks)
- b. With a neat sketch explain the working of the following:
 (i) Cathode Ray Tube
 (ii) LED (08 Marks)

OR

- 10 a. With a neat sketch, explain the working of x-y recorders and bridge type recorders. (10 Marks)
- b. With a neat sketch explain the working of the following:
 (i) Ultra-violet recorders
 (ii) Electro Cardio Graph (ECG) (10 Marks)
