GANPAT UNIVERSITY
B.TECH SEM-III (ELECTRICAL)
REGULAR EXAMINATION DEC-2012
2EE 304: ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENT

Time: 3 Hours

Total Marks:-70

Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

Que-1 (A) Derive torque equation for an electrodynamometer type instrument used as wattmeter. [06]

(B) A current transformer having a 1 turn primary is rated at 500/5 A, 50 Hz with an output of 15VA. At rated load with non-inductive burden, the inphase and quadrature component(reference to flux) of the exciting mmf are 8A and 10A respectively. The number of turns in the secondary is 98 and the resistance and leakage reactance of the secondary winding is 0.35Ω and 0.3Ω respectively. [06]

OR

Que-1 (A) What is energy? Discuss construction of induction type single phase energy meter. [06]

(B) Three identical coils, each of (4.2+ j5.6)ohms are connected in star across 415V, 3 phase, 50Hz supply. find (i) V_{ph} (ii) I_{ph} (iii) the two wattmeter reading W_1 and W_2 when they are connected to measure total power. [06]

Que- 2 (A) Draw the equivalent circuit and phasor diagram of C.T and derive the expression for phase angle error. [06]

(B) Describe the working of wein's bridge with suitable diagram. [05]

OR

Que- 2 (A) An Owen's bridge is used to measure the properties of a sample of sheet steel at 2 kHz. At balance, arm AB is test specimen; arm BC is R_3 =100 Ω; arm CD is C_4 = 0.1 uF and arm DA is R_3 =834Ω in series with C_2 = 0.124 uF. Derive balance Condition and calculate the effective impedance of the specimen under test condition. [06]

(B) Explain how power can be measure by 3-Ø circuit with the help of two wattmeter. Illustrate your answer with the help of a phasor diagram for a star connected load. [05]

Que-3 Attempt any two questions.

(A) Explain in details the effect of opening the secondary circuit of a current transformer when the primary winding is energized. [12]

(B) With neat block diagram explain the Frequency selective wave analyzer.

(C) What is the problem associate with measurement of low resistance? how are they Overcome through the use of Kelvin's double bridge.

SECTION-II

Que-4   (A) Differentiate between recording and integrating instrument, give suitable example in each case.   [04]

         (B) Describe the working of Maxwell's bridge and derive the relation for unknown quantity. Also draw phasor diagram.   [04]

         (C) Explain the working principle of single phase dynamometer type of power factor meter.   [04]

OR

Que-4   (A) Give the comparison between CT and PT.   [04]

         (B) Define following terms.   [04]

             (i) Sensitivity   (ii) Dead zone   (iii) Accuracy   (iv) precision

         (C) Discuss advantage and disadvantage of PMMC.   [04]

Que-5   (A) The four arm Schering bridge are arranged as follows: [06]

             Arm AB: imperfect capacitor.   Arm BC: resistance of 20000Ω.

             Arm CD: resistance of 1200Ω shunted by capacitor of 300 pF.

             Arm DA: Standard capacitor of 0.05 uF.

             All the resistors are non-reactive. The Supply of 1 KHz is connected to points A and C and detect to Points B and C. Calculate (i) the capacitance   (ii) the equivalent series resistance (iii) dissipation factor.

         (B) What is flux meter? Explain with suitable diagram.   [05]

OR

Que-5   (A) What do you mean by Epstein square? Explain bridge method for measurement of iron loss.   [06]

         (B) A 3-Ø energy meter having meter constant of 0.12 rev/kWh is used with a P.T of ratio 22000/110 and C.T of ratio 500/5 when connected to a load of unity P.F. The disc makes 40 revolution in 61 sec. if the instrument readings are 110 V and 5.25 amp. Find % error in energy meter.   [05]

Que-6   **Attempt any two questions.**   [12]

         (A) Classify the errors with their remedies.

         (B) Explain the working of a megger with help of a neat diagram.

         (C) Draw and explain construction of d' Arsonaval Galvanometer.

END OF PAPER
Best of Luck