Student Exam No:-_____

GANPAT UNIVERSITY

B.TECH SEM-III ELECTRICAL ENGINEERING

REGULAR EXAMINATION NOV-DEC-2014

2EE304:-ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS

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

Q:1 **(A)** Define the term 'Measurement' & classify the Different methods of measurement. **(4)**

(B) Explain the constructional & characteristic details of Weston Unsaturated standard cell. **(4)**

(C) The expected value of the voltage across a resistor is 80V. However, the measurement gives a value of 79V. Calculate **(4)**

1. Absolute error
2. % error
3. Relative accuracy
4. Percentage accuracy
5. Error expressed as a percentage of the full scale reading if the full scale deflection is 0-100V.

OR

Q:1 **(A)** Write a short note on resistance standard with neat sketch. **(4)**

(B) Explain briefly how a Wheatstone bridge is used for measurement of resistance. **(4)**

(C) What is controlling torque necessary in an indicating instrument? What would happen in the absence of a controlling torque? **(4)**

Q:2 **(A)** Describe the construction and working of PMMC instruments. Derive the equation for deflection if the instrument is spring controlled. **(5)**

(B) Explain the Hot wire instrument with the help of a neat diagram and magnification of expansion. **(6)**

OR

Q:2 **(A)** Determine the equivalent parallel resistance and capacitance that causes a Wein Bridge to null with the following components: **(5)**
R1=3.1kΩ, C1=5.2μF,R2=25 kΩ,R4=100kΩ,f=2.5kHz.

(B) Derive torque and force equation of electrostatic instrument for linear and rotational motion. **(6)**

Q:3 **Attempt any two:** **(12)**

(A) Explain the loss of charge method for the measurement of insulating resistance of a cable.

(B) With the help of circuit diagram explain how capacitance can be measured by the use of a 'schering bridge'

(C) Describe the working of Anderson bridge. Derive the equations for unknown quantity. Also draw phasor diagram

SECTION-II

Q:4 (A) Draw the equivalent circuit and phasor diagram of a Potential transformer. Derive the expressions for ratio and phase angle errors. Describe the assumptions made for derivation of error. (6)

(B) A 1000/5 A, 50 Hz current transformer has secondary burden comprising a non-inductive impedance of 1.6Ω. The primary winding has one turn. Calculate the flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 1.5 W at full load. The magnetizing mmf is 100 A. (6)

OR

Q:4 (A) Explain the construction and working of D'Arsonval type galvanometer. (6)

(B) Describe the constructional details of an electrodynamometer type wattmeter. Derive the expression for torque when the instrument is used on a.c. supply? (6)

Q:5 (A) With neat diagram explain the working of co-ordinate type of ac potentiometer. (5)

(B) Give reason of following statements (6)

(i) Why does the rotating disc of an induction type energy meter carry a small hole?

(ii) Why should the pressure coil of an induction type energy meter be highly inductive?

(iii) In case of energy meters, aluminum disc is preferred over copper disc even though copper is better conductor.

OR

Q:5 (A) Describe with the help of diagram the principle and working of a simple D.C. potentiometer. Explain how this potentiometer is standardized. (5)

(B) In the measurement of power by a polar potentiometer the following readings were obtained voltage across a 0.2 ohm, standard resistance in series with the load = $1.46\angle 32$. Voltage across a 200:1 potential divider across the line= $1.37\angle 56$ V. Estimate the current, voltage, power and power factor of the load. (6)

Q:6 **Attempt any two:** (12)

(A) Using expression for torque in single phase induction type energy meter, show that the total no of revolutions made by its disc during a particular time is proportional to the energy consumed.

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

(C) Draw the block diagram of CRO and explain briefly its major systems.

END OF PAPER

Best of Luck