Total Number of Pages: 02   **B.TECH**
PCEE4204

3rd Semester Regular / Back Examination 2015-16
ELECTRICAL AND ELECTRONICS MEASUREMENT
BRANCH: AEIE,EC,EIE,ETC,IEE
Time: 3 Hours
Max Marks: 70
Q.CODE: T555
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   Answer the following questions: **(2 x 10)**
   a) What are the dynamic characteristics of an instrument?
   b) A regular Wheatstone bridge is used to measure a mega ohm resistance. The bridge has ratio arms of 9988 and 10.The variable arm has a maximum resistance of 9999.What is the maximum resistance that can be measured by this arrangement.
   c) Define logarithmic decrement and what its unit is.
   d) In a dynamometer type instrument, the mutual inductance varies with deflection as "-6cos (30+Ө)" mH. Find the deflecting torque produced by a D.C current of 50mA corresponding to adeflection of 60.
   e) In a Drys dale polar potentiometer, what is the use of a variable capacitance?
   f) What are the disadvantages of moving Iron type power factor meter?
   g) In order to minimize the errors in a current transformer, the magnetizing and loss component in an instrument transformer must be kept low.
   h) Draw the block diagram of a true RMS voltage.
   i) Find the resolution of a $3\frac{1}{2}$ digit digital voltmeter used for measuring 0 to 1 volt.
   j) How does an amplifier introduce harmonic distortion of a signal in the output?

Q2 **a)** Explain the operation and working of Wagner Earthing device with neat circuit diagram.   **(5)**
   b) A balanced Hay's bridge has R$_2$=R$_3$=1000Ω, R$_4$=8120Ω, C$_4$=981pF and the frequency is 4000Hz. Calculate L$_1$& R$_1$. Also find out the Q-factor of the coil.   **(5)**

Q3 **a)** What is sensitivity and what are the different ways of defining it in galvanometers. Write the expressions for all.   **(5)**
   b) A single range potentiometer has a 18 step dial switch, where each step represents 0.1Volt. The dial resistors are 10Ω. The slide wire of the potentiometer is circular and has 11 turns and a resistance of 11Ω each. The slide wire has 100 divisions and interpolation can be done to one fourth of division. The working battery has voltage of 6Volt and negligible internal resistance. Calculate (a) the measuring range (b) resolution (c) working current (d) setting of the rheostat   **(5)**

Q4 What are the errors in electrodynamometer type Wattmeter's? Explain them **(10)**

Q5 **a)** The ratio error of a given 1000/5 A CT is zero when feeding 5VA, unity power factor burden at rated current. Estimate the iron loss of the transformer at this operating condition if the secondary has 198 turns and a winding resistance of 0.02Ω. Neglect leakage reactance. **(5)**

b) A wattmeter has current coil resistance of 0.03Ω and potential coil resistance of 6kΩ. Calculate the percentage error if the wattmeter is so connected that: (i) the current coil is on the load side. (ii) The potential coil is on the load side. The load takes 20A at a voltage 220V and 0.6 power factor in each case. **(5)**

Q6 **a)** Describe the working of a Q-meter with circuit diagram. **(5)**
b) Describe capacitance measurement by Owen's bridge with circuit diagram and expressions. **(5)**

Q7 **a)** Explain the phase and frequency measurement of ac quantity by CRO. **(5)**
b) Describe the working of a wave analyzer **(5)**

Q8 Write short notes on any two: **(5 x 2)**
a) Explain measurement of charge by Ballistic Galvanometer.
b) Describe the working of a power factor meter.
c) Measurement of mutual inductance by Felici's method.
d) Derive the expressions for Deflecting torque in PMMC type ammeter and voltmeter meter