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Total number of printed pages – 3

B. Tech
PCEE 4204

Third Semester Back Examination – 2014
ELECTRICAL AND ELECTRONICS MEASUREMENT

BRANCH (S) : AEIE, EC, EIE, ETC, IEE

QUESTION CODE : L 322

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.




1. Answer the following questions :

2 × 10

- Distinguish between "accuracy" and "precision".
- Why Maxwell Bridge is limited to the measurement of medium-Q coils ?
- List various methods used for the measurement of low, medium and high resistances.
- Write the parameters on which the critical damping of galvanometer depends. Why critical damping is important ?
- Give reasons for use of electrodynamic type instruments on both a.c. and d.c. circuits.
- What are the advantages of electronic voltmeter over electro-mechanical type voltmeter ?
- Mention the methods of adjustment of "FOCUS" and "INTENSITY" in oscilloscope.
- Define "harmonic distortion" and "distortion factor" of a signal.
- Draw the circuit diagram of an electro-dynamic wattmeter with power labeling.

P.T.O.

- (j) Explain why an electronic voltmeter gives more accurate readings in high resistance circuits as compared to a non-electronic voltmeter.
2. (a) Distinguish the construction between d'Arsonval, vibration and ballistic galvanometers. Write the applications of these galvanometers in measurement of electrical quantities. 5
- (b) Draw the circuit diagram and explain the method of measurement of self inductance by three voltmeter method. 5
3. (a) Derive the equation of balance for an Anderson's bridge. Draw the phasor diagram for condition under balance. 4
- (b) The four arms of a bridge are : 6
- Arm ab : an imperfect capacitor C_1 with an equivalent series resistance r_1 ,
- Arm bc : a non-inductive resistance R_3 ,
- Arm cd : a non-inductive resistance R_4 ,
- Arm da : an imperfect capacitor C_2 with an equivalent series resistance r_2 , series with a resistance R_2 .
- A supply of 450 Hz is given between terminals a and c and the detector is connected between b and d.
- At balance : $R_2 = 4.8 \Omega$, $R_3 = 2.0 \text{ k}\Omega$, $R_4 = 2.85 \text{ k}\Omega$, $C_2 = 0.5 \mu\text{F}$, and $r_2 = 0.5 \Omega$.
- Calculate the values of C_1 and r_1 , and also, calculate dissipation factor of this capacitor. Deduce the expression used.
4. Draw the equivalent circuit and phasor diagram of a current transformer. Derive the expression for ratio and phase angle errors. 10
5. (a) What are creeping and phantom loading ? Explain in brief. 5
- (b) The meter constant of a 230 V, 10 A wattmeter is 1800 revolutions per kWh. The meter is tested at half load and rated voltage and unity power-factor. The meter is found to make 80 revolutions in 138 sec. Determine the meter errors at half-load. 5

6. (a) Explain how the frequency and phase of an ac quantity is measured with the help of a CRO. 5
- (b) What are the advantages and disadvantages of electro-dynamometer type of instruments ? 5
7. (a) Describe with a neat diagram, the Wien's bridge method for measurement of unknown frequency. 5
- (b) With the help of a suitable block diagram explain the operation of a dual slope integrating type of DVM. 5
8. Write short notes on any **two** of the following: 5×2
- (a) Accuracy and precision
 - (b) AC potentiometers
 - (c) Q meter
 - (d) Spectrum analyzer.
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