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BIEE-007

00566

B.Tech. - VIEP - ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

June, 2019

BIEE-007 : ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Time : 3 hours *Maximum Marks : 70*

Note : *(i) Attempt **any seven** questions.*

*(ii) **All** questions carry **equal** marks.*

(iii) Use of scientific calculator is allowed.

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1. (a) Differentiate between Deflection and Null type of instruments with a suitable example. 5

   (b) Describe the construction and working of dynamometer type instruments. Derive the equation for deflection under a.c. operation if the meter is spring control. 5

2. Derive the expression for critical damping resistance of a galvanometer. The coil of a ballistic galvanometer has 115 turns of mean area 25×40 mm^2. The flux density in the air gap is 0.12 Wb/m^2 and the moment of inertia is 05×10^{-6} kg-m^2. The stiffness constant of spring is 45×10^{-6} Nm/rad. What current must be passed to give a deflection of 100° ? Find CDRX to be added for providing critical damping. 10

3. (a) A moving coil instrument has a resistance of 5 Ω between terminals and full-scale deflection is obtained with a current of 15 mA. This instrument to be used with a manganin shunt to measure 100 A at full scale. Calculate the error caused by 10°C rise in temperature : 6

(i) When internal resistance of 5 Ω is due to copper only.

(ii) When a 4 Ω manganin swamping resistance is used in series with a copper coil of 1 Ω resistance. The resistance temperature coefficients of copper and manganin are 0.4% per °C and 0.015% per °C rise respectively.

(b) Discuss a method for the measurement of insulation resistance. 4

4. (a) Describe the working of Hay's bridge and derive the balance equation and draw the phasor diagram. 5

(b) Discuss the Murray and Varley loop tests for localization of cable faults. 5

5. (a) Describe the method for determination of B-H curve of a magnetic material using step-by-step method. 5

(b) Describe the construction and working of a power-factor meter. 5

6. How will you compensate for inductance of pressure coil in an EDM type wattmeter ? What is the frequency range for this type of compensation ? Also explain two watt meters method for measurement of power consumed by a star connected load. Draw the phasor diagram for the same. 10

7. (a) Describe the construction and working of a digital oscilloscope. Compare its relative merits and demerits with analog oscilloscope. 5

(b) Explain the different laws of illumination with their appropriate applications. 5

8. (a) Describe the construction and working of a photoconductive cell. Give its illumination characteristics, merits, demerits and applications. 5

(b) What are the primary, reference and working standards of sources of light ? Explain how standard lamps are calibrated with primary standards. 5

9. Write short notes on **any two** of the following : **2x5=10**

(a) Harmonic Analyzer.

(b) Induction and Electrostatic type Instruments.

(c) Current transformer and Potential transformer.