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

Term-End Examination

ОО423   **December, 2018**

BIEE-007 : ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Time : 3 hours   *Maximum Marks : 70*

*Note : Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. Briefly describe the principle of operation of deflection type and null type instruments. Discuss the various static and dynamic characteristics of measurement systems.   *10*

2. (a) A voltage has a true value of 1 V. An analog indicating instrument with scale range 0 – 1·5 V shows a voltage of 0·96 V. What are the values of absolute error and corrections ? Express the error as a function of true value and full scale deflection.   *5*

(b) Discuss about the various operating forces of an electro-mechanical system. What are the effects used in instruments for their operation ?   *5*

3. (a) Explain how an electrodynamometer type instrument is able to measure the true r.m.s. value of a voltage of current irrespective of its waveform. Also discuss the main sources of errors in electrodynamometer type instruments.   *5*

(b) How is error due to change in temperature minimized in ammeters and voltmeters ? A moving coil instrument whose resistance is 25 Ω gives a full scale deflection with a voltage of 25 mV. This instrument is to be used with a series multiplier to extend its range to 10 V. Calculate the error caused by 10°C rise in temperature.   *5*

4. (a) What are the advantages and disadvantages of Maxwell's inductance-capacitance bridge ?   *5*

(b) Deduce the unknown parameters for the Schering bridge and also draw its phasor diagram.   *5*

5. (a) Classify potentiometers. What do you mean by potentiometer standardization ? Illustrate with a suitable diagram. 5

(b) Explain substitution method for measuring unknown resistance. What factor affects the accuracy of this method ? 5

6. (a) Derive correction factor for instrument transformers for leading and lagging power factors using suitable phasor diagram. Define the terms used properly. 4

(b) Derive the torque equation for an electrodynamometer type wattmeter. Discuss error causes due to mutual inductance between current and pressure coils. Name a wattmeter having zero mutual inductance error. 6

7. (a) Explain the construction and working of dual beam and dual trace types of oscilloscopes with their applications. 6

(b) Describe the methods of measurement of illumination of different light sources. Also explain illuminous efficiency. 4

8. (a) In a CRT, the distance between the deflecting plates is 1 cm, the length of the deflecting plates is 4·5 cm and the distance of the screen from the centre of the deflecting plates is 33 cm. If the accelerating voltage supply is 300 V, calculate the deflecting sensitivity of the tube. *5*

(b) Explain the methods for determination of mean horizontal candle power and mean spherical candle power of a lamp. *5*

9. Write short notes on any *two* of the following : *2×5=10*

(a) Three phase induction type energy meter

(b) Measurement of Flux and Permeability

(c) Carey Foster Slide Wire Bridge