B.E. DEGREE EXAMINATIONS: APRIL / MAY 2009

Third Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EI 301 Electrical Measurements and Instruments

Time: Three Hours Maximum Marks: 100

Answer ALL the Questions:-

PART A (20 x 1 = 20 Marks)

1. A Ballistic galvanometer should be designed with

   a) a large period of natural oscillations and a negligible damping constant
   b) a small period of natural oscillations and a high damping constant
   c) a large period of natural oscillations and a high damping factor
   d) a small period of natural oscillations and a low damping factor

2. An electrodynamometer type of instruments finds its major use as:

   a) standard instrument only
   c) both as standard and transfer instrument
   b) transfer instrument only
   d) an indicator type of instrument

3. Which meter has the highest accuracy in the prescribed limit of frequency range:

   a) PMMC
   c) Electrodynamometer
   b) Moving Iron
   d) Rectifier

4. The range of an electrostatic voltmeter can be extended by using:

   a) A capacitor in series with the voltmeter whose capacitance is greater than the capacitance of the voltmeter.
   b) A capacitor in series with the voltmeter whose capacitance is smaller than the capacitance of the voltmeter.
   c) A resistor in series with the voltmeter
   d) An inductor in series with the voltmeter

5. In an electrodynamometer type of wattmeter:

   a) the current coil is made fixed
   b) the pressure coil is made fixed
   c) any of the two coils can be made fixed
   d) both the coils should be movable

6. The power in a three phase circuit is measured with the help of 2 wattmeters. The readings of one of the wattmeters is positive and that of the other is negative. The magnitude of readings is different. It can be concluded that the power factor of the circuit is:

   a) unity   b) zero (lagging)   c) 0.5 (lagging)   d) less than 0.5 (lagging)

7. If an Induction type Energy meter runs fast, it can be slowed down by:
   a) lag adjustment
   b) Light load adjustment
   c) by adjusting the position of braking magnet and making it come closer to the centre of the disc.
   d) by adjusting the position of braking magnet and making it move away from the centre of the disc.

8. In an induction type of meter, maximum torque is produced when the phase angle , between the two fluxes is:

   a) $0°$ b) $45°$ c) $60°$ d) $90°$

9. A potentiometer is basically a:

a) deflection type instrument
b) null type instrument
c) deflection as well as null type instrument
d) digital instrument

10. Standardisation of potentiometers is done in order that, they become

a) accurate
b) precise
c) accurate and direct reading
d) accurate and precise

11. The current in the primary winding of a current transformer depends upon:

a) burden of the secondary winding of transformer
b) load connected to the system in which the C.T. is installed
c) both burden of the transformer secondary winding and load connected to the system.
d) turns ratio

12. In case of potential transformers:

a) the phase angle error is always positive
b) the phase angle error is always negative
c) the phase angle error is usually zero
d) the phase angle error is positive when the secondary winding voltage reversed leads the primary winding voltage and is negative when the secondary winding voltage reverse lags behind the primary winding voltage.

13. From the point of view of safety, the resistance of earthing electrode should be

a) low
b) high
c) medium
d) the value of resistance of earth electrode does not affect the safety.

14. The advantage of Varley loop tests over Murray loop test is

a) they can be used for localizing of short circuit faults
b) they can be used for localizing of earth fault
c) the loop resistance can be experimentally determined
d) their accuracy is higher

15. In a series type of ohmmeter the zero adjustment should be done

a) by changing the value of series resistance
b) by changing the value of shunt resistance connected across the meter movement
c) by changing both series as well as the shunt resistance
d) by changing the battery voltage.

16. A Meggar is used for measurement of
a) low valued resistances
b) medium valued resistances
c) low and medium valued resistances
d) high valued resistances, particularly insulation resistance

17. a) Maxwell's inductance –capacitance bridge is used for measurement of inductance of

a) low Q coils
b) medium Q coils
c) high Q coils
d) low and medium Q coils

18. Frequency can be measured by using

a) Maxwell's bridge
b) Schering bridge
c) Heaviside Campbell bridge
d) Wien's bridge

A bridge circuit works at a frequency of 2 kHz. The following can be used as detectors for detection of null conditions in the bridge.

a) Vibration galvanometers and headphones
b) Headphones and tunable amplifiers
c) Vibration galvanometers and tunable amplifiers
d) Vibration galvanometers, headphones and tunable amplifiers

20. A vibration galvanometer is tuned

a) by changing the length and tension of vibrating coil
b) by attaching weight to the vibrating coil
c) by changing its damping constant
d) by changing the resistance of the coil

PART B (5x16 = 80 Marks)

21.(a) i) Describe the constructional details and principle of operation of a d'Arsonval galvanometer. Derive the expression for steady state deflection. (8)

ii) With a neat sketch describe the construction and working of a ballistic galvanometer. Explain the difference in constructional details of ballistic galvanometer and a d'Arsonval galvanometer. (8)

(OR)

21.(b) i) Explain why electrodynamometer type of instruments cn be used in both on ac and dc.? Why these instruments used as transfer instruments? (8)

ii) Discuss the following types of errors in moving instruments:

1) Hysterisis error
2) temperature error
3) errors on account of stray magnetic fields
4) errors on account of change of frequency. (8)

22.(a) i) Describe the constructional details of an electrodynamometer type of wattmeter. Derive the expression for torque when the instrument is used on ac. (8)

ii) Describe the construction and working of a two element Induction type energy meter. (8)

(OR)

22.(b) i) What is phantom loading? Explain with an example how is it more advantageous than testing with direct loading. (8)

ii) Enumerate the different of tests that are carried out on single phase Induction type watt-hour meters. Describe the Long period dial test. (8)

23.(a) i) Draw the circuit diagram of a Crompton's potentiometer and explain its working. (8)

ii) Describe the construction and working of a polar type potentiometer. How is it standardized? (8)

(OR)

23.(b)i) Draw the equivalent circuit and phasor diagram of a current transformer. Derive the expressions for ratio and phase angle errors. (8)

ii) Explain the Absolute Null method for testing of a potential transformer. (8)

24.(a) i) Draw the circuit of a Kelvin's double Bridge used for measurement of low resistances. Derive the condition for balance. (8)

ii) What are the different difficulties encountered in the measurement of high resistances? Explain how these difficulties are overcome. (8)

(OR)

24.(b) i) Explain the working of a megger with the help of neat diagram. (8)

ii) What is the importance of the value of Earth's resistance. Describe the fall of potential method for measurement of earth resistance. (8)

25.(a) i) Derive the equations for balance in the case of Maxwell's inductance capacitance bridge. Draw the phasor diagram for balance conditions. (8)

ii) Derive the equations of balance for an Anderson's bridge. Draw the phasor diagram for balance conditions. (8)

(OR)

25.(b) i) Explain the construction and working of a vibration galvanometer. Explain how a vibration galvanometer is tuned. (8)

ii) What are the various faults that occur in cables? Explain how the cable faults are located. (8)

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