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**Reg. No. :**

**Question Paper Code: 43055**

B.E. / B.Tech. DEGREE EXAMINATION,NOV 2017

Third Semester

Electronics and Instrumentation Engineering

14UEI305 – ELECTRICAL MEASUREMENTS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. The power consumption PMMC instruments is typically about

(a) 0.25 *W* to 2*W* (b) 0.25 *mW* to 2 *mW* (c) 25*µW* to 200*µW* (d) None of the above

2. The relative damping in a galvanometer is 0.8. Its logarithmic decrement is approximately

(a) 0.48 (b) 1.25 (c) 4.19 (d) -4.19

3. The instantaneous torque of an Electrodynamometer is

(a) *I1I2* (b) *I1I2 dM/dθ* (c) *I1I2 cos Ф* (d) *dM/dθ*

4. Creeping in a Single phase induction type energy meter may be due to

(a) Overcompensation for friction (b) Overvoltage (c) Vibrations (d) All of the above

5. A current transformer has a rating of 100/5 *A*. Its magnetizing and loss component are 1 *A* and 0.6 *A* respectively and secondary winding burden is purely resistive, its transformation ratio at rated current is

(a) 20.12(b) 20.2 (c) 200.2 (d) 203

6. The standardization of A.C potentiometer is done by

(a) Directly using a.c standard voltage sources(b) Using d.c standard sources and transfer instruments (c) Using d.c standard and D’Arsonval galvanometer (d) Using a.c standard sources and transfer instruments

7. A Wheatstone bridge cannot be used for precision measurements because errors are introduced into an account of

(a) Resistance of connecting leads (b) Thermo-electric emfs (c) Contact resistances (d) All the above

8. A Wheatstone bridge has ratio arms of 1000*Ω* and 100*Ω* resistance, the standard resistance arms consists 4 decade resistance boxes of 1000, 100, 10, 1*Ω* steps. The maximum and minimum values of unknown resistance which can be determined with this setup is

(a) 111100*Ω*,1*Ω* (b) 11110*Ω*,10*Ω* (c) 111100*Ω*,10*Ω* (d) none of the above

9. The frequency can be measured using

(a) Maxwell’s bridge (b) Campbell’s bridge (c) Wein’s bridge (d) Anderson’s bridge

10. 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) all the above

PART - B (5 x 2 = 10 Marks)

11. Justify how deflection is proportional to square of RMS value of operating current in Moving Iron Instruments.

12. Define Phantom loading .

13. Why secondary of current transformer should not be open?

14. List the applications of megger.

15. State the balance equation used in A.C bridge methods.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) What is the principle of operation of D’arsonval galvanometer? Give constructional details of D’arsonval galvanometer and explain what the constants that are related with a galvanometer. (8)

(ii) When a current of 0.001*A* is passed through a moving coil galvanometer find final steady state deflection of coil and also the deflection when the scale is placed 1*meter* away from the mirror. Also find critical damping resistance of galvanometer when relative damping is 0.1, length of coil is 2.5 *cm*, width is 2 *cm*, no of turns is 100, flux density is 0.1 *wb/m2*, moment of inertia *J=*20\*10(-8) *kgm*2  and stiffness constant is 25\*10(-6) *Nm/rad*. (8)

Or

(b) Describe the constructional details and principle of operation of a D’Arsonval galvanometer. Derive the expression for steady state deflection. (16)

17. (a) With neat diagram, explain the working of an electrodynamometer type Wattmeter.

Derive an expression for deflection torque and mention its significance. (16)

Or

(b) Explain the construction, theory and operation of single phase induction type energy meters with neat diagrams. (16)

18. (a) Discuss the construction and working of drysdale polar type potentiometer. (16)

Or

(b) (i) Discuss the construction and working of drysdale polar type potentiometer. (8)

(ii) What are the functions of transfer instrument and phase shifting transformer? (8)

19. (a) Write short notes on the following methods of measuring resistances:

(i) Ammeter-Voltmeter method

(ii) Substitution method (16)

Or

(b) Explain the loss of charge method for measurement of insulation resistances of cables. (16)

20. (a) (i) Describe the working of an Anderson’s bridge. Derive the equation of balance. (8)

(ii) Explain the measurement of inductance using Maxwell - Wein’s bridge circuit.

(8)

Or

(b) Give a detailed account of vibration galvanometers. (16)