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SE-8089

B. E. - II (Sem - III) (Electrical) Examination

May / June – 2011

Electrical & Electronics Measuring Instruments

Time : Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 2 (Sem - 3) (Electrical)**

Name of the Subject :

☛ **Electrical & Electronics Measuring Instruments**

☛Subject Code No. : **8 0 8 9** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Attempt all the questions.

(3) Figures to the **right** indicate full marks.

(4) Assume suitable data if necessary.

1 (a) Answer the following questions. **8**

(i) On what principle does D'Arsonval galvanometer operate ?

(ii) What is meant by electromagnetic damping.

(iii) How can the range of ballistic galvanometer is increased?

(iv) What is difference between fundamental and derived unit?

(v) What happens when an ammeter is connected across the circuit ?

(vi) What type of damping is provided in PMMC instruments?

(vii) What is difference between Accuracy and Precision ?

(viii) Why permanent magnet moving coil instruments cannot be used for ac measurement of high frequency ?

(b) State "Ture" of "False" for the following sentences. **2**

(i) Megaohm sensitivity is reciprocal of current sesnsitivity.

(ii) Swamping resistance is connected in series with a voltmeter coil in order to reduce the full-scale current.

(c) The expression for the eddy current loss P per meter length of wire may be written as, **6**

$$P \propto f^a B_{m}{}_b d^c p^g$$

Where f = frequency
B_m = Maximum flux density
D = Diameter of wire
p = Resistivity of material

Find the values of a,b,c and g using LMTI system.

(d) What is loading effect ? Explain with the suitable example. **4**

2 (a) Derive Torque equation for moving iron instruments and Errors in moving iron instruments. **8**

(b) The inductance of a moving iron instruments is given by $L = (12 + 6\theta - \theta^2)\mu H$. Where θ is the deflection in radians from zero position. The spring constant is 12* 10^{-6} Nm/radians. Calculate the deflection for a current of 8 A. **4**

OR

2 (a) Explain the Construction and Derive Torque equation of D'Arsonval Galvanometer. **9**

(b) Comparison between Gravity control and Spring control system. **3**

3 Attempt and **"three"**. **18**

(i) Expalin the operation of vibrating reed type frequency meter.
(ii) Explain the fluxmeter operation.
(iii) Write a short note on phase sequence indicators.
(iv) Explain the various method of providing damping torque in an indicating instruments.

4 (a) State 'True' or 'False' for the following statements. **5**

(i) In an electrodynamometer type wattmeter the potential coil is made fixed.

(ii) The digital tachometer is used to measure torque of a motor.

(iii) Deflection type analog voltmeter is better than Electronic voltmeter.

(iv) In shunt type ohmmeter the unknown resistance is connected in series with the meter.

(v) A potentiometer can be used for calibration of wattmeter.

(b) Answer the following questions :

(i) Define : **3**

(1) Creeping, (2) Peak factor, (3) Form factor

(ii) List any two advantages of Electronics voltmeter. **2**

(c) Explain the principle and construction of single phase induction type energy meter. **10**

5 (a) Prove that the relation : **8**

True power / Actual wattmeter reading $= \cos\phi / \cos\beta . \cos(\phi - \beta)$ where $\cos\phi$ = p.f. of circuit, $\beta = \tan^{-1}(WL/R)$ where L and R are the inductance and the resistance of the pressure coil of the circuit.

(b) Explain 'true RMS responding' voltmeter. **7**

OR

5 (a) With a suitable circuit diagram explain the construction and write steps that are used for measurement of unknown emf by Crompton's potentiometer. **8**

(b) Explain Drysdale Tinsley AC Potentiometer. **7**

6 Answer any **three**. **15**

(a) List the advantages and disadvantages of two wattmeter method.

(b) Explain calibration of d.c. ammeter with d.c. potentiometer.

(c) Write a short note on Electronic Energy meter.

(d) A 230 V, single phase, watt-hour meter has a constant load of 5A passing through it for 8 hours at 0.9 p.f. If the meter disc makes 4968 revolutions during this period, find the meter constant in the revolutions per kWh. Find the power factor of the load if the no. of revolutions made are 2100 when operating at 230 V and 6 A for 5 hours.

(e) A sawtooth voltage has a peak value of 80 V and a time period of 2.0 s as shown in fig.1. Find the error when measuring this voltage with average reading voltmeter calibrated in terms of r.m.s. value of sinewave.

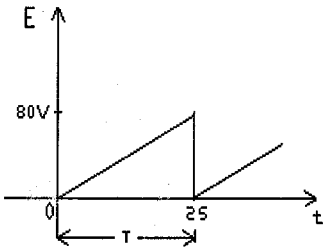

Fig. 1