



SE-6811

B. E. - III (Sem. V) (EL) Examination
April / May - 2011
Electrical Measurement & Instruments-I

Time : Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दशांशवैल निशानीवाणी विगतो उत्तरवडी पर अवश्य कभवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. - 3 (SEM. 5) (EL)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="ELECTRICAL MEASUREMENT & INSTRUMENTS-1"/>	<input type="text"/>
Subject Code No. : <input type="text" value="6"/> <input type="text" value="8"/> <input type="text" value="1"/> <input type="text" value="1"/>	<input type="text"/>
Section No. (1, 2,.....) : <input type="text" value="NIL"/>	
Student's Signature	

- (2) Attempt all questions.
- (3) Assume suitable data if required.
- (4) Support your answers with neat sketches.
- (5) Figures to the right indicate maximum marks.

1 (a) Attempt the following :

- (1) Why is Wheatstone bridge not suitable for measurement of low resistance ? 2
- (2) Vibration galvanometer can be used for frequency between _____ to _____ Hz. The current sensitivity is about _____ with scale 1 metre away. 2
- (3) Why is Hay's bridge suited for measurement of inductance of high Q coils ? 2
- (4) A ballistic galvanometer should be designed with _____ period of natural oscillation and _____ damping constant. 2
- (5) Write the expression for true value of flux density in a ring specimen in terms of measured value of flux density, magnetizing force, area of cross section of specimen, area of cross section of coil producing magnetic force. 2

- (b) Explain construction of Ballistic galvanometer. 10
Also explain different methods used for calibration of ballistic galvanometer.
- 2 (a) Describe Kelvin's double bridge method used for 8
measurement of low resistance. Also derive condition of balance.
- (b) Describe how an unknown capacitance can be measured 7
with help of schering bridge. Derive equations and draw phasor diagram under condition of balance.

OR

- 2 (a) Explain in detail loss of charge method for 8
measurement of insulation resistance of cable.
- (b) A bridge consists of the following 7
Arm ab - a choke coil having a resistance R_1 and inductance L_1
Arm bc - a non-inductive resistance R_3
Arm cd - a mica - condenser C_4 in series with
a non - inductive resistance R_4
Arm da - a non-inductive resistance R_2
When this bridge is fed from a source of 500 Hz balance is obtained under following conditions.
 $R_2 = 2410 \Omega$, $R_3 = 750 \Omega$, $C_4 = 0.35 \mu F$,
 $R_4 = 64.5 \Omega$,
The series resistance of capacitor is 0.4Ω . Calculate the resistance and inductance of the choke coil. The supply is connected between a and c and the detector is between b and d.
- 3 Attempt any **three** : 15
- (1) Explain any one method used for measurement of medium resistance in detail.
- (2) Explain the function and working of Wagner Earth device.
- (3) Explain how the value of ac permeability of magnetic material is determined through the use of Maxwell's Bridge.
- (4) Explain construction and working of vibration galvanometer.
- (5) What are the sources of error in a.c. bridges ? Explain in detail.

- Q-4 (a) State 'True' or 'False' for the following statements.** 5
- (1) In an electro-dynamometer type wattmeter the current coil is made fixed.
 - (2) In C.T., for all inductive burdens the secondary winding current lags behind the secondary induced voltage E_s .
 - (3) Moving iron instruments are the polarized instruments.
 - (4) 1000 kilowatt hour is equal to one unit.
 - (5) A potentiometer is basically a null type instrument.
- (b) Answer the following questions:**
- (i) Define: (1) Energy (2) Creeping 2
 - (ii) Draw practical wattmeter connection for measurement of single phase power. 2
 - (iii) Define 'Burden' of C.T. 1
- (c) Explain construction and working principle of PMMC instruments.** 10
- Q-5 (a) Explain the principle and construction of single phase induction type energy meter.** 8
- (b) Prove that the relation:** 7
- $$\text{True power} / \text{Actual wattmeter reading} = \cos \phi / \cos \beta \cdot \cos (\phi - \beta)$$
- where $\cos \phi = \text{p.f. of circuit}$, $\beta = \tan^{-1} (WL/R)$
 where L and R are the inductance and the resistance of the pressure coil of the circuit.

OR

- Q-5 (a) Draw vector diagram of C.T. and derive an expression for ratio error.** 8
- (b) A 1000/5 A, 50 Hz current transformer has a secondary burden comprising a non inductive impedance of 1.6 Ω . The primary winding has one turn. Find the flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 1.5 W at full load.** 7

- Q-6 Attempt any Three.** 15
- (1) Explain construction of Electro-dynamometer type wattmeter.
 - (2) Write advantages and disadvantages of PMMC instruments.
 - (3) Derive the expression of deflecting torque in single phase induction type energy meter.
 - (4) The voltage-ratio box shown in fig.1 is designed in such a way that when 100 V is applied to the input terminals, the output voltage of 2 V is available at the output terminals of the box. Additionally the total resistance at input terminal must be equal to 10 M Ω . Determine voltage box ratio and values of R_1 & R_2 .

