



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/B.Tech/EE(N)/EEE(N)/ICE(N)/PWE(N)/SEM-4/EE-402/2013**

**2013**

**ELECTRICAL & ELECTRONIC MEASUREMENT**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

$10 \times 1 = 10$

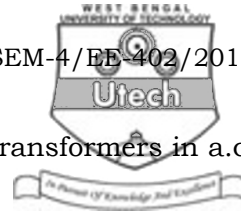
- i) When the potentiometer is balanced, the current through the battery under test is
- a) same as through the supply battery
  - b) 1/10th of that through the supply battery.
  - c) zero
  - d) half through the supply battery.



- ii) If the secondary winding of a current transformer is open circuited when connected in line
  - a) low currents are induced in the secondary
  - b) high voltages are induced in the secondary
  - c) low voltages are induced in the secondary
  - d) high currents are induced in the secondary.
- iii) The balance obtained from a Wheatstone bridge
  - a) depends on the value of the supply voltage
  - b) independent of the supply voltage from the battery
  - c) depends on the resistor used
  - d) none of these.
- iv) In a Megger, the resistance to be measured is connected
  - a) in series with the control coil
  - b) in series with deflecting coil
  - c) in parallel with the deflecting coil
  - d) in parallel with the control coil.
- v) The example of integrating instrument is
  - a) moving coil meter
  - b) moving iron meter
  - c) tangent galvanometer
  - d) energy meter.







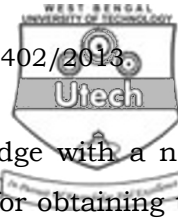
3. a) State the need for using instrument transformers in a.c. circuits ?  
b) Why is the secondary winding of an instrument transformer usually earthed ?
4. Explain how a low resistance is measured by a potentiometer.
5. Define gauge factor of a strain gage & obtain its expression.
6. Explain how the phase & frequency of an a.c. quantity are measured with CRO.

### GROUP - C

#### ( Long Answer Type Questions )

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Draw the equivalent circuit & phasor diagram of a current transformer.  
b) Derive the expression of ratio & phase angle error.  
c) In a certain current transformer, the following data is obtained. Nominal ratio = 25/5A, Turn ratio = 3, primary turns = 40, secondary turns = 120, secondary resistance =  $0.16\Omega$ , secondary reactance =  $0.195\Omega$ , secondary burden = 15 VA, Burden power factor = 0.7, secondary terminal voltage = 3V. Find ratio & phase angle errors. The magnetising and loss ampere turns corresponding to an emf of 4.26V are 13 & 10.1 respectively.  $5 + 5 + 5$



8. a) Explain the working of Anderson's bridge with a neat sketch. Derive the required expression for obtaining the unknown inductance.
- b) A Wheatstone bridge has the following resistances :  
 $AB = 200\Omega$ ,  $BC = 20\Omega$ ,  $CD = 8\Omega$  &  $DA = 100\Omega$ . A galvanometer of  $40\Omega$  is connected across BD. Find the current through the galvanometer when 20V is applied across A.C. 9 + 6
9. a) Describe with neat sketch the principle of operation of d.c. permanent magnet moving coil type instrument. Explain how the deflecting torque, control torque & damping torque are obtained in the same instrument.
- b) Why moving iron instruments always have non-uniform scales ?
- c) A moving coil voltmeter with resistance of  $10\Omega$  gives full scale deflection with a potential difference of 45 mV. The coil has 100 turns, an effective depth of 3cm & a width of 2.5 cm. The controlling torque exerted by the spring is 0.5 gm. cm. Calculate the flux density in the air gap. 7 + 3 + 5
10. a) Explain with a neat sketch, the working of an a.c. potentiometer.
- b) Discuss its use for the calibration of –
- i) an Ammeter,    ii) a Wattmeter. 7 + 8



11. Write short notes on any *three* of the following

- a) Temperature transducers
  - b) Digital voltmeter.
  - c) Double beam CRO
  - d) Wattmeter errors.
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