



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH(ECE-OLD)/SEM-3/EI-302/2011-12**

**2011**

**ELECTRONIC MEASUREMENT AND  
INSTRUMENTATION**

*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 × 1 = 10

- i) The torque produced in a wattmeter is proportional to
  - a) the average value of currents in two coils
  - b) the rms value of currents in two coils
  - c) the average value of supply voltage
  - d) none of these.



ii) Creeping is observed in

- a) Watt-hour meter
- b) Wattmeter
- c) Ammeter
- d) power factor meter.

iii) A mA D' Arsonval galvanometer has a resistance of  $100\Omega$ . It is to be converted to a 10 V voltmeter. The value of multiplier resistance is

- a)  $999\Omega$
- b)  $9999\Omega$
- c)  $9900\Omega$
- d)  $990\Omega$ .

iv) Which of the following bridges is preferred for the measurement of inductance having high Q-factor ?

- a) Maxwell's bridge
- b) Hay bridge
- c) Owen bridge
- d) DeSauty bridge.

v) A pyrometer is calibrated between 200-1000 degree Celsius. Its span is

- a) 800 degree Celsius
- b) 200 degree Celsius
- c) 1000 degree Celsius
- d) 1200 degree Celsius.



vi) A transducer converts

- a) mechanical energy into electrical energy
- b) mechanical displacement into electrical energy
- c) one form of energy into another form of energy
- d) electrical energy into mechanical form.

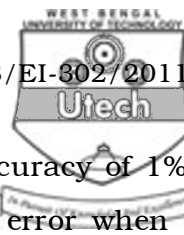
vii) The gauge factor is defined as

- |  |  |
|--|--|
| a) $\frac{\frac{\Delta L}{L}}{\frac{\Delta R}{R}}$ | b) $\frac{\frac{\Delta R}{R}}{\frac{\Delta L}{L}}$ |
| c) $\frac{\frac{\Delta L}{L}}{\frac{\Delta D}{D}}$ | d) $\frac{\frac{\Delta R}{R}}{\frac{\Delta D}{D}}$ |

viii) In an electro-dynamometer type Wattmeter

- a) Current coil is fixed
- b) Pressure coil is fixed
- c) both of these are fixed
- d) both of these are movable.





- b) A 0-10A ammeter has a guaranteed accuracy of 1% of FSD. Calculate the percentage limiting error when the reading is 5A. 3 + 2
3. How can the phase difference of two sinusoidal signals be measured using CRO ? 5
4. What is Strain Gauge ? Write the use of it. What is the Gauge factor of the Strain Gauge ? 1 + 2 + 2
5. Describe the working principle and construction of PMMC instrument. 5
6. Derive the balance equation of Hay's Bridge for measurement of inductance. 5

### GROUP – C

#### ( Long Answer Type Questions )

Answer any *three* of the following. 3 × 15 = 45

7. a) Explain the function of internal structure of a CRT with a neat diagram.
- b) What are Lissajous pattern. Explain how phase and frequency can be measured using this fig. 10 + 2 + 3



8. a) Explain the operating principle of a DMM using a suitable block diagram.

b) With neat sketch, describe the operating principle of dual slope integrating type of DVM. 7 + 8

9. a) State and explain in brief the working principle of LVDT.

b) How can you measure pressure by using Bourdon tube ?

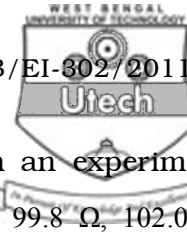
c) What is a thermocouple ? What is Seebeck effect ?

5 + 5 + 5

10. With neat phasor diagram, describe the method of measurement of inductance with the help of Anderson bridge. What types of detectors are used for ac bridge ? What is the 'Wagner earthing device' ? 5 + 5 + 5

11. a) What are the different errors encountered in measurement ? How can they be avoided ?

b) What are the names of the different standard inputs for studying the dynamic response of a system ? Define and sketch them.



- c) Ten observations of resistance made in an experiment are 100.4  $\Omega$ , 99.2  $\Omega$ , 101.1  $\Omega$ , 100.5  $\Omega$ , 99.8  $\Omega$ , 102.0  $\Omega$ , 99.9  $\Omega$ , 101.7  $\Omega$ , 100.8  $\Omega$ , 101.2  $\Omega$ . Calculate (i) Arithmetic mean, (ii) Average deviation, (iii) Standard deviation, (iv) Variance. 2 + 3 + 4 + 6

12. Write short notes on any *three* of the following : 3  $\times$  5

- a) Q-meter
  - b) Thermistorsp
  - c) DC-potentiometer
  - d) Digital Storage oscilloscope
  - e) Signal generator.
-