



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech/(ECE-NEW)/SEM-6/EC-605C/2013

2013

**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)

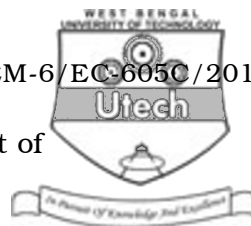
1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) The term 'threshold' use in instrumentation means
 - a) The smallest change in input which can be detected
 - b) A measure of linearity of the system
 - c) The smallest input which can be detected
 - d) A measure of precision of the system.
- ii) Which instrument used for both *ac* and *dc* measurements ?
 - a) Moving Iron
 - b) Electrodynamometer
 - c) Electrostatic
 - d) All of these.
- iii) Maxwell bridge can be used for measurement of inductance with
 - a) high *Q* factors
 - b) very low *Q* factors
 - c) medium *Q* factors
 - d) wide rang of *Q* factor variations.



- iv) An aquadag is used in a CRO to collect
 - a) Primary electrons
 - b) Secondary emission electrons
 - c) Both primary and secondary emission electrons
 - d) None of these.
- v) The spectrum analyzer displays the signal spectrum in
 - a) Time domain
 - b) Frequency domain
 - c) Z-domain
 - d) All of these.
- vi) Which of the following bridge is used to measure frequency of a signal ?
 - a) Maxwell's Bridge
 - b) Anderson's Bridge
 - c) DeSauty's Bridge
 - d) None of these.
- vii) Creeping is observed in
 - a) Watt-Hour meter
 - b) Volt Meter
 - c) Ammeter
 - d) Q Meter
- viii) Low resistance can be measured by
 - a) Wheatstone bridge
 - b) Kelvin's Double bridge
 - c) Maxwell's bridge
 - d) Wien's bridge.
- ix) Thermocouple is a
 - a) Passive transducer
 - b) Active transducer
 - c) Piezoelectric transducer
 - d) none of these.
- x) Energy meter is an
 - a) Integrating instrument
 - b) Recording instrument
 - c) Indicating instrument
 - d) none of these.



- xi) A megger is used for the measurement of
- Low value resistance
 - medium value resistance
 - high value resistance
 - all of these.
- xii) A digital voltmeter measures
- Peak value
 - Peak to peak value
 - rms value
 - average value.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- Define the terms : Accuracy, Precision, Sensitivity, Lag, Relative limiting error.
- With suitable diagram describe the operation of an Electro dynamic wattmeter.
- Briefly explain the working principle of sweep generator.
- What is the role of multiplexing in a Data Acquisition System ? Explain.
- Draw and Explain the working principle of a 'true RMS meter'.

GROUP – C

(Long Answer Type Questions)

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

- Explain the functional block diagram of CRO with neat diagram.
 - What is Lissagous figure ? Explain how phase and frequency can be measured using this figures.
 - What are the differences between CRO dual beam and dual trace ? What is the function of delay line ?

$$7 + (1 + 3) + (3 + 1)$$



8. a) Describe the construction and working principle of a moving iron instrument ? What kind of damping is employed here ?
- b) Why is the scale cramped at the lower end in moving iron instrument ? How does it differ from a PMMC instrument ?
- c) A moving coil instrument has the following data :
 Number of turns : 100, width of the coil = 20 mm, depth of the coil = 30 mm, flux density in the air gap = 0.1 Wb/m^2 . Calculate the deflecting torque when carrying a current of 10 mA. Also calculate the deflection if the control spring constant is $2 \times 10^{-6} \text{ Nm/degree}$. (5 + 1) + (2 + 4) + 3
9. a) What are the different types of wave analyzer ? What are the applications of wave analyzer ? Define harmonic distortion and the term total harmonic distortion.
- b) With neat diagram explain the working principle of frequency meter. And what are the techniques used for extending the frequency range ? Give a diagram for measuring the time. (1 + 1 + 3) + (5 + 2 + 3)
10. a) Briefly describe the operation of a digital frequency counter.
- b) What are the errors associated with measurement of frequency and time in frequency counter ?
- c) Explain Digital multi-meter (DMM) with diagram. 5 + 4 + 6
11. Write short notes on any *three* of the following : 3 × 5
- Measurement errors
 - Multiplex
 - ϕ -meter
 - Optical power measurement
 - Successive approximation-type digital voltmeter.
