

CS/B.Tech/ECE/Even/Sem-6th/EC-605C/2015



WEST BENGAL UNIVERSITY OF TECHNOLOGY

EC-605C

ELECTRONIC MEASUREMENT & INSTRUMENTATION

Time Allotted: 3 Hours

Full Marks: 70

The questions are of equal value.

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. Answer any *ten* questions. 10×1 = 10
- (i) In an instrument the smallest measurable input is known as
(A) threshold (B) resolution
(C) dead zone (D) none of these
- (ii) Systematic errors are
(A) instrumental errors (B) environmental errors
(C) random errors (D) both (A) and (B)
- (iii) An aquadag is used in a CRO to collect
(A) primary emission electrons
(B) secondary emission electrons
(C) both primary and secondary emission electrons
(D) none of these

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- (iv) Electrostatic type instruments are primarily used as
(A) ammeters (B) wattmeters
(C) voltmeters (D) ohmmeters
- (v) A megger is used to measure
(A) voltage (B) current
(C) insulation resistance (D) none of these
- (vi) For measurement of low impedance by Q-meter the component is connected in
(A) parallel (B) series
(C) direct (D) none of these
- (vii) The advantage of PMMC instrument is
(A) low power consumption (B) no hysteresis loss
(C) efficient eddy current damping (D) all of these
- (viii) Which instrument cannot be used both for AC and DC measurements?
(A) dynamometer type (B) induction type
(C) electrostatic type (D) moving iron type
- (ix) A true RMS responding voltmeters makes use of
(A) thermistor (B) RTDs
(C) LVDTs (D) thermocouples
- (x) The phenomena of creeping occurs in
(A) Ammeter (B) Voltmeter
(C) Wattmeter (D) Watt-hour-meter
- (xi) A digital voltmeter measures
(A) peak value (B) peak to peak value
(C) RMS value (D) average value

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(xii) The full form of DAS is

- (A) Digital to Analog System (B) Discrete Analog System
(C) Data Acquisition System (D) None of these

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.

3×5 = 15

2. Show that the driving torque in a moving-iron instrument is given by
 $T_D = \frac{1}{2} I^2 \frac{dL}{d\theta}$, where the symbols have their usual meaning. 5
3. Define the terms accuracy, precision, resolution, speed of response and error. 5
4. (a) What are the Lissajous figure? Explain how phase and frequency are measured by using them. 3
 (b) What do you mean by 'deflection sensitivity' and 'deflection factor'? 2
5. Explain the difference between dynamometer wattmeter and induction type wattmeter. 5
6. Draw the block diagram for a chopper-stabilized amplifier, which is used in a low level instrument and also, explain its operation. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.

3×15 = 45

7. (a) Write briefly about the construction of an electrodynamic-type instrument. 6
 (b) Derive the torque equation of the instrument when an AC current is passed through the coil. 6
 (c) List the principal errors of this type of instrument. 3

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8. (a) Draw the functional block diagram of a DMM. Explain how AC current is converted into an equivalent DC voltage for operation. 5
 (b) Define Q-factor of a coil. With the help of a circuit diagram, explain the operation of a basic Q-meter. 5
 (c) Describe the series connection method of a Q-meter to determine the values of pure resistance, capacitance and inductance. 5
9. (a) "All dual beam CRO are named as Dual trace CRO" justify. 3
 (b) Explain the operation of dual trace CRO with proper block diagram. 6
 (c) How does the alternative sweep compare to chop sweep? When would one mode be selected over the other? 4
 (d) Write the function of aquadag. 2
10. (a) What are the objectives of Data Acquisition System (DAS)? 3
 (b) With a neat block diagram explain the different elements of the Data Acquisition System. 5
 (c) Define Total Harmonic Distortion (THD). 2
 (d) With a schematic block diagram explain the heterodyne wave analyzer. 5
11. Write short notes on any *three* of the following: 3×5
 (a) Optical power measurement
 (b) Signal generator
 (c) Frequency meter
 (d) Spectrum analyzer
 (e) Digital storage oscilloscope
 (f) PMMC instrument.

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