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Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(EE)-2024

Course Name – Electrical and Electronics Measurement

Course Code - BTE40107

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Tell them that a null-type instrument is compared to a deflection-type instrument.
 - a) has a lower sensitivity
 - b) has a faster response
 - c) has a higher accuracy
 - d) all of these
- (ii) Select which of the following is not a basic component of an instrument
 - a) Sensor
 - b) Signal conditioner
 - c) Display
 - d) Actuator
- (iii) Identify the purpose of a calibration procedure for a meter
 - a) To adjust the meter to the correct range and resolution
 - b) To check the accuracy and linearity of the meter
 - c) To verify the meter's compliance with international standards
 - d) All of the above
- (iv) Select the purpose of a power factor correction capacitor
 - a) To increase the voltage in an electrical circuit
 - b) To regulate the current in an electrical circuit
 - c) To improve the power factor of an electrical circuit
 - d) To prevent overloading of an electrical circuit
- (v) Choose passive electrical component
 - a) Battery
 - b) Transistor
 - c) Diode
 - d) Resistor
- (vi) Choose that the CRO is used in a radar for _____
 - a) studying the pattern of flights
 - b) visualizing a target
 - c) measuring voltage
 - d) determining the distance between source and destination
- (vii) Choose that the temperature transducers make use of _____
 - a) change in resistivity
 - b) change in area

- c) change in length
d) change in capacitance
- (viii) Predict the piezoelectric transducer consists of _____
a) copper rod
b) aluminum wire
c) gold crystal
d) quartz crystal
- (ix) Identify the factor affecting response speed of an instrument.
a) Damping
b) Accuracy
c) Precision
d) None of the above
- (x) Calculate the multiplier resistance required to extend the range of a 100V voltmeter to 1000V, if the meter resistance is 1000 ohms.
a) 9000 ohms.
b) 10000 ohms.
c) 11000 ohms.
d) 900 ohms.
- (xi) Compute the error if a 10V reading is measured as 9.8V.
a) 0.2V.
b) 0.1V.
c) 0.3V.
d) 0.4V.
- (xii) Indicate the purpose of a multiplier in a voltmeter.
a) Extends voltage range
b) Decreases resistance
c) Increases current flow
d) Measures power
- (xiii) The term sensitivity of an instrument. is defined as the
a) Ability to measure large range
b) Ability to measure small changes
c) Speed of response
d) Accuracy of measurement
- (xiv) Identify the purpose of a creeping test in energy meters
a) Measures current change
b) Detects abnormal movement
c) Tests load conditions
d) Checks core saturation
- (xv) The term 'sweep speed' in a CRO is defined as
a) Movement of beam speed
b) Speed of horizontal deflection
c) Speed of beam intensity
d) Speed of waveform display

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Identify the types of errors in measurement and give one example for each. (3)
3. Explain the reason of the following statement: "the scale of a moving iron instrument is not uniform". (3)
4. Explain the importance of the triggering circuit in a CRO. (3)
5. Calculate the series resistance required to extend the range of a voltmeter from 100V to 300V, if the internal resistance of the meter is 500 ohms. (3)
6. Write the use of signal conditioning in transducer-based systems. (3)

OR

- Develop a procedure to calibrate a thermistor-based temperature transducer. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Define resolution and speed of response in measuring instruments. (5)
8. Describe the construction of repulsion type moving iron instrument with neat diagram. (5)
9. In an electrodynamic instrument the total resistance of the voltage coil circuit is 8200 Ω and the mutual inductance changes uniformly from -173 μH at zero deflection to +175 μH at full scale. The angle of full scale being 95°. If a potential difference of 100 V is applied across the voltage circuit and a current of 3 A at a power factor of 0.75 is passed through the current coil, calculate the deflection. Spring constant of the instrument is 4.63×10^{-6} N-m/rad. (5)

10. Summarize the standard operating procedure for testing an energy meter. (5)

11. The coil of a PMMC instrument has 60 turns on a former that is 18 mm wide, the effective length of the conductor being 25 mm. It moves in a uniform field flux density 0.5 T. The control spring constant is 1.5×10^{-6} N-m/degree. Evaluate the current require to produce a deflection of 100° .. (5)

12. Develop a circuit to measure 3-phase power using 2 wattmeter method. (5)

OR

Develop a circuit to measure 3-phase power using single wattmeter method. (5)

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