



## BRAINWARE UNIVERSITY

Term End Examination 2023

Programme – B.Tech.(EE)-2021

Course Name – Electrical and Electronics Measurement

Course Code - PCC-EE403

( Semester IV )

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Brainware University  
Barasat, Kolkata -700125

Time : 2:30 Hours

Full Marks : 60

[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) In Maxwell's inductance bridge, what happens if the values of the inductances in the two arms of the bridge are not equal?
- a) The bridge is still balanced  
b) The bridge is unbalanced  
c) The bridge becomes unstable  
d) The bridge becomes sensitive to noise
- (ii) What is Earth Resistance?
- a) Resistance offered by the earth to the flow of current  
b) Resistance offered by the conductor to the flow of current  
c) Resistance offered by the insulation to the flow of current  
d) Resistance offered by the transformer to the flow of current
- (iii) Identify why a purely mechanical instruments cannot be used for dynamic measurements because they have
- a) large time constant  
b) higher response time  
c) high inertia  
d) all of the above
- (iv) Identify the relationship between frequency and time period?
- a) Time Period =  $10/\text{frequency}$   
b) Frequency =  $1/\text{Time period}$   
c) Time Period = frequency  
d) Frequency = Time period
- (v) What is the power output of a device that consumes 500 watts of energy in 10 seconds?
- a) 500 W  
b) 50 W  
c) 5 W  
d) 0.5 W
- (vi) Choose the instrument is used to measure the phase difference between two AC voltages or currents
- a) Phase meter  
b) Phase shifter  
c) Oscilloscope  
d) Spectrum analyzer



- (vii) Define resolution of a meter
- a) The smallest change in the quantity being measured that can be detected by the meter
- b) The accuracy of the meter
- c) The repeatability of the meter
- d) The linearity of the meter
- (viii) Explain 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
- (ix) What is the function of an instrument transformer?
- a) To amplify the signal from a transducer
- b) To step down the voltage or current of a circuit
- c) To isolate the circuit from the power source
- d) To convert DC voltage to AC voltage
- (x) How does an instrument transformer extend the range of an instrument?
- a) By providing a secondary circuit with a higher voltage or current
- b) By providing a secondary circuit with a lower voltage or current
- c) By converting AC voltage to DC voltage
- d) By amplifying the signal from a transducer
- (xi) Select advantage of power factor correction
- a) Lower current and voltage
- b) Higher current and voltage
- c) Lower power consumption
- d) Higher power consumption
- (xii) Select which of the following instruments is commonly used to measure low resistances?
- a) Kelvin Double bridge
- b) Wheatstone bridge
- c) Megger
- d) All of the above
- (xiii) Select the desirable static characteristics of a measurement are
- a) precision
- b) accuracy
- c) sensitivity
- d) all of these
- (xiv) In a power system with two generators, which of the following is the correct procedure for synchronizing them using a synchroscope?
- a) Adjust the frequency of both generators until they match
- b) Adjust the voltage of both generators until they match
- c) Adjust the phase angle of one generator until the synchroscope indicates they are in phase
- d) Adjust the phase angle of both generators until the synchroscope indicates they are out of phase
- (xv) Which of the following is true about a single-phase power factor meter?
- a) It measures the power factor of a single-phase circuit only
- b) It uses a dynamometer to measure the power factor
- c) It is only suitable for measuring small loads
- d) All of the above

### Group-B

(Short Answer Type Questions)

2. Draw the 3 phase wattmeter construction. (3)
3. Define the terms accuracy, precision and resolution as used for indicating instruments. (3)
4. Describe loading effects of indicating instruments (3)
5. Explain the working of PMMC type instruments. (3)
6. How to calculate phase difference from oscilloscope? (3)

OR

Calculate the multiplying power of a shunt of 200 ohm resistance use with a galvanometer of 1000 ohm resistance. Determine the value of shunt resistance to give a multiplying power of 50. (3)

**Group-C**

(Long Answer Type Questions)

5 x 6=30

7. Describe the construction of MI type instruments with neat diagram. (5)
8. Describe the construction of Dynamometer type instruments with neat diagram. (5)
9. Explain various parts of CRO with neat sketch. (5)
10. Demonstrate LVDT. (5)
11. Develop the block diagram of digital multimeter. (5)
12. A wattmeter has a current coil of 0.1 ohm resistance and a pressure coil of 6500 ohm resistance. Calculate the percentage errors due to the resistance when a) the current coil is on load side, b) the pressure coil is on load side; when reading the input to an apparatus which takes 12 A at 250 V with unity power factor. (5)

**OR**

A 3 phase 500 V motor load has a power factor of 0.4. Two wattmeters connected to measure the input. They show the input to be 30 kW. Estimate the readings of the instruments. (5)

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