31. a. Determine the differential amplifier equation using Operational amplifier. | 12 | 3 | 4

(OR)

   b. Examine the working of voltage follower circuit and list its advantages. | 12 | 3 | 4

32. a. Demonstrate the calibration process of practical instruments. | 12 | 3 | 5

(OR)

   b. Outline how to calibrate a digital multimeter. | 12 | 3 | 5

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B.Tech. DEGREE EXAMINATION, JUNE 2023
Third Semester

18EIC201T – ELECTRICAL AND ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:
(i) **Part – A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part – B & Part – C** should be answered in answer booklet.

Time: 3 hours   Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer ALL Questions

	Marks	BL	CO

1. In electrical measuring instruments electrical energy is converted to | 1 | 1 | 1
   (A) Mechanical energy   (B) Heat energy
   (C) Chemical energy   (D) Light energy

2. Electrodynamic types of instruments are used commonly for the measurement of | 1 | 1 | 1
   (A) Current   (B) Resistance
   (C) Voltage   (D) Power

3. In _____ instruments the deflecting torque depends on the frequency | 1 | 1 | 1
   (A) Induction type   (B) Hot wire
   (C) Moving coil   (D) Moving iron

4. In order to get best results, indicating instruments are | 1 | 1 | 1
   (A) Overdamped   (B) Underdamped
   (C) Critically damped   (D) Damped slightly less than the critical value

5. Which of the following method of measurement does a bridge circuit uses? | 1 | 1 | 2
   (A) Relative   (B) Comparison
   (C) Absolute   (D) Differential

6. Which of the following is the most popular method for measuring low resistance? | 1 | 1 | 2
   (A) Ducter ohmmeter method   (B) Kelvin double bridge method
   (C) Ammeter-voltmeter method   (D) Potentiometer method

7. Under which of the following conditions a bridge is balanced? | 1 | 1 | 2
   (A) When no current flows   (B) When the temperature of the circuit is high
   (C) When power dissipation is high (D) When no voltage drop across the circuit

8. A Schering bridge can be used for the _____   1 1 2
   (A) Protecting the circuit from temperature rises
   (B) Testing capacitors
   (C) Measuring voltages
   (D) Measuring currents

9. CRO stands for _____   1 1 3
   (A) Cathode ray oscilloscope
   (B) Current resistance oscillator
   (C) Central resistance oscillator
   (D) Capacitance resistance oscilloscope

10. Electron beam is deflected in _____   1 1 3
    (A) 1 direction
    (B) 4 directions
    (C) 3 directions
    (D) 2 directions

11. The digital storage oscilloscope comes in _____ types.   1 1 3
    (A) One
    (B) Two
    (C) Three
    (D) Four

12. What is the standard form of MDO?   1 1 3
    (A) Mixed digital oscilloscope
    (B) Mixed discrete oscilloscope
    (C) Mixed domain oscilloscope
    (D) Mixed digital oscillator

13. Transit time noise is   1 1 4
    (A) Low frequency noise
    (B) High frequency noise
    (C) Due to random behaviour of carrier charges
    (D) Due to increase in reverse current in the device

14. Noise is added to a signal in a communication system   1 1 4
    (A) at the receiving end
    (B) at transmitting antenna
    (C) in the channel
    (D) during regeneration of the information

15. What are filters created by using resistors and capacitors or inductors and capacitors called?   1 1 4
    (A) Active filters
    (B) Passive filters
    (C) Continuous filters
    (D) Differential filters

16. An RC coupling circuit is an example of what type of filter?   1 1 4
    (A) Low pass filter
    (B) High pass filter
    (C) Band pass filter
    (D) All pass filter

17. Which of the following adjustments is usually adjusted first in an instrument requiring calibration?   1 1 5
    (A) Dead band
    (B) Span
    (C) Hysteresis
    (D) Zero

18. What is the maximum permissible error for class I micrometers?   1 1 5
    (A) 0.002 mm
    (B) 0.004 mm
    (C) 0.008 mm
    (D) 0.016 mm

19. Accuracy of an measuring instrument indicates the   1 1 5
    (A) Closeness of the output reading to the true value
    (B) Ratio of output value to the input value
    (C) Change in output with each change in input
    (D) Degree of freedom from random errors

20. Low accuracy measurements from a high precision instrument are normally caused by   1 1 5
    (A) Bias in the measurement
    (B) Human errors
    (C) Instrumental defect
    (D) Low temperature

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

	Marks	BL	CO
21. Derive the torque equation for PMMC instrument.	4	1	1
22. Recall the Andersons bridge circuit for measuring inductance.	4	1	2
23. Describe the working of USB Oscilloscope.	4	2	3
24. Summarize the types of passive filters.	4	2	4
25. Discuss the need for calibration of instruments.	4	2	5
26. Explain the process of grounding.	4	2	2
27. Discuss the working power quality analyser.	4	2	3

PART – C (5 × 12 = 60 Marks)
Answer ALL Questions

Marks BL CO

28. a. With a neat sketch, explain the Construction and Breaking Mechanism of Single phase induction meter.   12 3 1

(OR)

b. With a neat sketch, explain the construction and working of Electrodynamometer and list the source of errors in it.   12 3 1

29. a. The four arms of Maxwells inductance bridge are; Arm AB contains an Inductive coil of inductance L1 having resistance R1. Arms BC and CD contain non-inductive resistances of 200Ω and 100Ω, respectively. Arm AD contains a standard inductor of inductance L2 and resistance R2. Balance is obtained when L2=50mH and R2=2Ω. Determine L1, R1, and Q factor for the frequency f= 50 Hz.   12 3 2

(OR)

b. The arms of a four arm bridge abcd, supplied with sinusoidal voltage, have the following values: Arm ab: a resistance of 200 ohm in parallel with a capacitor 1 μF. Arm bc: 400 ohm resistance Arm cd: 1000 ohm resistance Arm da: a resistance of R2 in series with a 2 μF capacitance. Determine the value of R2 and the frequency at which the bridge will balance.   12 3 2

30. a. Demonstrate the working of Function generator with a block diagram.   12 3 3

(OR)

b. Outline the working of HMI and USB oscilloscope.   12 3 3