

CHAPTER-7. MEASUREMENTS & INSTRUMENTATION

- [1] The major advantage of electromagnet type meter over a permanent magnet meter is
- A. The electromagnet meter costs much less
 - B. The permanent magnet meter has a more sluggish coil
 - C. The electromagnet meter need not be aligned with the earth's magnetic field
 - D. **The electromagnet meter is more rugged**
- [2] A thermocouple
- A. **Gets warm when dc flows through it**
 - B. Is a thin, straight, special wire
 - C. Generates ac when heated
 - D. Generates dc when exposed to visible light
- [3] If the readings of the two watt meters in the 2 watt meter method of power measurement are 4.5 kW and 3.5 kW respectively and the latter reading has been obtained after reversing the current coil of the watt meter. What will be the total power in kW?
- A. **1**
 - B. 3.5
 - C. 4.5
 - D. 8
- [4]The major advantage of an electrostatic meter is
- A. It can handle large currents
 - B. It measures very small currents
 - C. **It can detect and indicate ac voltages as well as dc voltages**
 - D. It draws a large current from a power supply.
- [5] The change in the direction of a compass needle, when a current carrying wire is brought near, is called
- A. **Electromagnetic deflection**
 - B. Electroscopic force
 - C. Magnetic force
 - D. Electrostatic force
- [6] Ammeter shunts are useful because
- A. They prevent overheating of the meter movement
 - B. They make a meter more physically rugged
 - C. **They allow for measurement of large currents**
 - D. They increase meter sensitivity
- [7] Suppose a certain current in a galvanometer causes the compass needle to deflect by 20 degree, then this current is doubled while the polarity stays the same. The angle of the needle deflection will
- A. Reverse direction
 - B. Stay the same
 - C. **Increase**
 - D. Decrease
- [8] The major advantage of FETVM over a conventional voltmeter is that FETVM
- A. Can withstand higher voltages safely
 - B. **Draws less current from the circuit under test**
 - C. Can measure lower voltages
 - D. Is sensitive to ac voltage as well as to dc voltage
- [9] The attraction or repulsion between two electrically charged objects is called
- A. Electromagnetic deflection
 - B. **Electrostatic force**
 - C. Electroscopic force
 - D. Magnetic force
- [10] A utility meter's reading indicates
- A. Current
 - B. Power
 - C. Voltage
 - D. **Energy**
- [11] When a signal of 10 mV at 75 MHz is to be measured then which of the following instrument can be used

- a) VTVM
b) Cathode ray oscilloscope
c) Moving iron voltmeter
d) Digital multimeter
- [12] The most useful transducer for displacement sensing with excellent sensitivity, linearity and resolution is?
a) an incremental encoder
b) an absolute encoder
c) LVDT
d) a strain gauge
- [13] When variable reluctance type tachometer has 150 teeth on the rotor & the counter records 13,500 pulses per second then the rotational speed will be?
a) 4800 rpm
b) 5400 rpm
c) 6000 rpm
d) 7200 rpm.
- [14] One of the following, which is not a transducer in the true sense, is ?
a) Thermocouple
b) Piezoelectric pick up
c) Photo-Voltaic cell
d) LCD
- [15] Choose the correct statement
(a) Digital multimeters are built using current measuring elements, while analog multimeters are built using voltage measuring units
(b) Digital multimeters are built using voltage measuring units, while analog multimeters are built using current measuring units
(c) Both digital and analog multimeters are built using voltage measuring units
(d) Both digital and analog multimeters are built using current measuring units
- [16] An oscilloscope cannot be used to indicate
A. Frequency
B. Peak signal voltage
C. Energy
D. Wave shape
- [17] In two watt meter method of power measurement, if one of the watt meter shows zero reading, then it can be concluded that
A. Power factor is unity
B. Power factor is zero
C. Power factor is 0.5 lagging
D. Power factor is 0.5 leading
- [18] voltmeters should generally have
A. High internal resistance
B. Low internal resistance
C. The ability to withstand large currents
D. The greatest possible sensitivity
- [19] To measure the applied power supply voltage to the electrical circuit, the voltmeter should be placed
A. In series with the circuit that works from the supply
B. Between the positive pole of the supply and the circuit working from the supply
C. Between the negative pole of the supply and the circuit working from the supply
D. In parallel with the circuit that works from the supply
- [20] Which will not normally cause a large error in an ohmmeter reading?
A. A slight change in switchable internal resistance
B. A small voltage between points under test
C. A small change in the resistance to be measured
D. A slight error in the range switch position
- [21] Which is not function of the fuse?

- A. To ensure there is enough current available for and appliance to work right**
B. To make sure the current drawn by an appliance can not exceed a certain limit
C. To limit the amount of power that a device can draw from the electrical circuit
D. To make it impossible to use appliances that are too large for a given circuit
- [22] The utility meter's motor speed depends directly on
A. The number of watt hours being used at the time
B. The number of ampere hours being used at the time
C. The number of watts being used at the time
D. The number of kilowatt hours being used at the time
- [23] A typical frequency counter
A. Works by indirectly measuring voltage
B. Is accurate to six digits or more
C. Works by indirectly measuring current
D. Has an analog readout
- [24] A VU meter is never used to get a general indication of
A. Sound intensity
B. Visible light intensity
C. Power in an audio amplifier
D. Decibels
- [25] An analog voltmeter has a sensitivity of 10k/volt. The galvanometer used in constructing the instrument will produce a full scale deflection when the current passed through it is
 [10] An analog voltmeter has a sensitivity of 10k
 (a) 10 mA
 (b) 20 mA
 (c) 50 mA
(d) 100 μ A
- [26] Two sinusoidal signals of the same frequency are displayed on a dual-trace oscilloscope. One complete cycle of each signal covers 6 cm of the horizontal scale and the starting point of the horizontal scale and the starting point of the two signals are separated by 0.5 cm. The phase difference between the two signals in degrees is
(a) 30
 (b) 45
 (c) 60
 (d) 90
- [27] Transient signals can be observed using
(a) Storage oscilloscope
 (b) Sampling oscilloscope
 (c) Wave analyzer
 (d) Spectrum analyzer
- [28] The trace on an oscilloscope continually moves to the right of the screen when
 (a) The sweep is triggered
 (b) The sweep period is larger than the signal period
(c) The sweep period is smaller than the signal period.
 (d) There is no sweep.
- [29] In a dual trace oscilloscope, the display appears segmented when
 (a) low frequency signals are observed in Alternate mode
 (b) low frequency signals are observed in Chop mode
 (c) high frequency signals are observed in Alternate mode
(d) high frequency signals are observed in Chop mode
- [30] The meter movement in an illumination meter directly measures
A. Current
B. Power
C. Voltage
D. Energy

[31] Consider the following statements:

- 1.The main shortcomings of diaphragms are that they are prone to shock vibrations.
- 2.Diaphragms have the advantages of high accuracy and good dynamic response
- 3.Selection of material for diaphragms mainly depends upon temperature range and chemical nature of fluid coming in contact with diaphragm during pressure measurement.

Which of the above statements is/are correct? [IES2010]

- A. 1,2 and 3**
- B. 2 and 3 only
- C. 1 only
- D. 1 and 2 only

[32] If reflection coefficient for voltage be 0.6, the voltage standing wave ratio(VSWR) is [IES2010]

- A.0.66
- B.4**
- C.1.5
- D.2

[33] A resistance strain gage with gage factor (S_f) of 2 is bonded to a steel member, which is subjected to a strain of 1×10^{-6} . The original resistance value of this strain gage is 120Ω . The change in resistance due to the applied strain is [IES2010]

- A. 60Ω
- B. $240 \times 10^{-6} \Omega$**
- C. 240Ω
- D. $60 \times 10^{-6} \Omega$

[34] Consider the following statements: [IES2010]

Piezoelectric materials

- 1.Crystal can be shown as electrical equivalent circuit similar to an inductor and a capacitor(Tank circuit).
- 2.Quartz,Rochelle salt,tourmaline.
- 3.Used in voltage stabilizers.
- 4.This exhibits the reverse effect of electrostriction.

Which of the above statements are correct?

- A.1,2 and 4 only**
- B.1 and 2 only
- C.2 and 4 only
- D.1,2,3 and 4**

[35] Consider the following units for the measurement of pressure directly: [IES2010]

- 1.Rolta meter
- 2.Bourdon tube
- 3.Planti meter
- 4.Vanes

Of these, the pressure can be measured by

- A. 1 and 2 only**
- B. 3 and 4 only
- C. 2 only**
- D. 1,2,3 and 4

[36] The measurement of Hall coefficient of a semiconductor with one type of charge carrier gives the information about [IES2010]

- A. sign of charge carrier
- B. density of charge carrier
- C. both sign and density of charge carrier**
- D. mass of the charge carrier

[37] A piezoelectric crystal has a thickness of 2.5mm and a voltage sensitivity of 0.05Vm/N . The piezoelectric crystal is subjected to an external pressure of $1.6 \times 10^6\text{N/m}^2$, then the corresponding output voltage is, [IES2010]

- A. 200V**
- B. $3.2 \times 10^9\text{V/m}$ of thickness

C. $0.07 \times 10^{-9} \text{V}/(\text{m}^3/\text{New})$

D. 200m V

[38] The two inputs of a CRO are fed with two stationary periodic signals. In the X-Y mode, the screen shows a figure which changes from ellipse to circle and back to ellipse with its major axis changing orientation slowly and repeatedly. The following inference can be made from this. [GATE2009]

A. The signals are not sinusoidal

B. The amplitudes of the signals are very close but not equal

C. The signals are sinusoidal with their frequencies very close but not equal

D. **There is a constant but small phase difference between the signals**

[39] The pressure coil of a dynamo meter type wattmeter is [GATE2009]

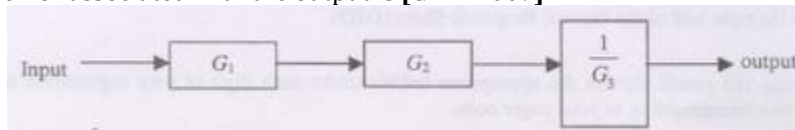
A. Highly inductive

B. **Highly resistive**

C. Purely resistive

D. Purely inductive

[40] The measurement system shown in the figure uses three sub systems in cascade whose gains are specified as G_1 , G_2 and $1/G_3$. The relative small errors associated with each respective subsystem G_1 , G_2 , G_3 are ϵ_1, ϵ_2 and ϵ_3 . The error associated with the output is [GATE2009]



A. $\epsilon_1 + \epsilon_2 + 1/\epsilon_3$

B. $(\epsilon_1 \epsilon_2) \epsilon_3$

C. $\epsilon_1 + \epsilon_2 - \epsilon_3$

D. $\epsilon_1 + \epsilon_2 + \epsilon_3$

[41] A hot-wire ammeter

A. **Can measure ac as well as dc**

B. Registers current changes very fast

C. Can indicate very low voltages

D. Measures electrical energy

[42] The device used to indicate the presence of an electric current is

A. Electrometer

B. **Galvanometer**

C. Voltmeter

D. Coulometer

[43] A watt-hour meter measures

A. Voltage

B. Current

C. **Energy**

D. Power

[44] A voltmeter should have

A. Low internal resistance

B. **High internal resistance**

C. Electrostatic plates

D. A sensitive amplifier

[45] An average-reading digital multimeter reads 10V when fed with a triangular wave, symmetric about the time-axis. For the same input an rms-reading meter will read [GATE]

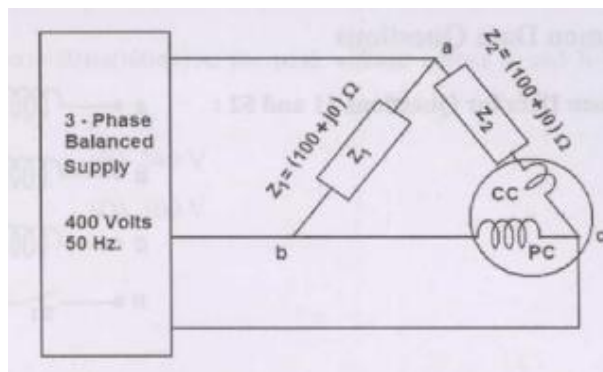
A. $20/\sqrt{3}$

B. $10/\sqrt{3}$

C. $20\sqrt{3}$

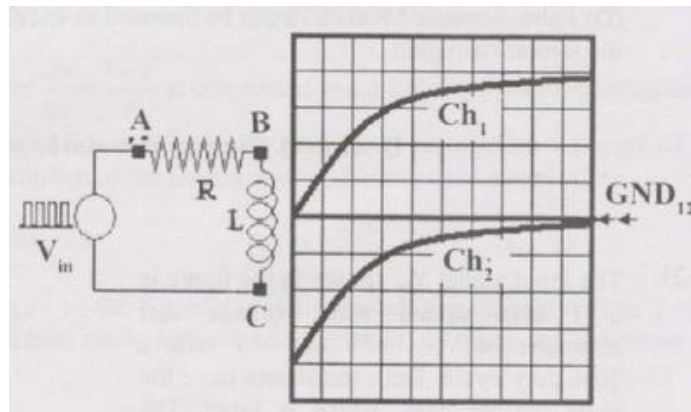
D. $10\sqrt{3}$

[46] The figure shows a three-phase delta connected load supplied from a 400V, 50Hz, 3-phase balanced source. The pressure coil(PC) and current coil(CC) of a wattmeter are connected to the load as shown, with the coil polarities suitably selected to ensure a positive deflection. The wattmeter reading will be [GATE]



- A. 0
- B. 1600Watt
- C. **800Watt**
- D. 400Watt

[47] The probes of a non-isolated, two channel oscilloscope are clipped to points A, B and C in the circuit of the adjacent figure. V_{in} is a square wave of a suitable low frequency. The display on Ch1 and Ch2 are as shown on the right. Then the "signal" and "ground" probes S1, G1 and S2, G2 of Ch1 and Ch2 respectively are connected to points [GATE 2007]



- A. A, B, C, A
- B. **A, B, C, B**
- C. C, B, A, B
- D. B, A, B, C

[48] An analog voltmeter uses external multiplier settings. With a multiplier setting of $20k\Omega$, it reads 440V and with a multiplier setting of $80k\Omega$ it reads 352V. For a multiplier setting of $40k\Omega$, voltmeter reads [GATE2012]

- A. 371V
- B. 383V
- C. 394V
- D. **406V**

[49] The rate at which charge carriers flow is measured in

- A. Coulombs
- B. **Amperes**
- C. Watt-hour
- D. Watts

[50] The main problem with bar-graph meters is that

- A. They are not very sensitive
- B. They are unstable
- C. **They cannot give very precise readings**
- D. They can display only peak values