UNIT-1:

MULTIPLE CHOICE QUESTIONS:

1. Which of the following is caused by careless handling?
   a)Systematicerror
   b)Grosserror
   c)Randomerror
   d) None of the mentioned
   Answer:b
   Explanation: Gross errors are mostly due to lack of knowledge, judgment and care on the part of experiment. That is Gross error is caused by careless handling.

2. A system will be error free if we remove all systematic error'. Is this statement true or false?
   a)True
   b) False
   Answer:b
   Explanation: Random errors will remain in a system even if we remove all Systematic errors. Random errors are also known as residual errors.

3. Which of the following is not a fundamental quantity?
   a)Length
   b)Angle
   c)Time
   d) Luminous intensity

Answer:b

Explanation: Derived units are those expressed in terms of fundamental units. Primary or fundamental units cannot be expressed in terms of other units.

4. Which of the following error is caused by poor calibration of instrument?

a)Randomerror

b)Grosserror

c)Systematicerror

d) Precision error

Answer:c

Explanation: Systematic errors are caused by poor calibration of instruments.

5. How systematic errors are eliminated?

a)Frequentmeasurement

b)Replacement of instrument

c)Finding mean of reading

d) Finding variance of reading

Answer:b

Explanation: The possible way of eliminating systematic error is replacement of instruments. Systematic errors are caused by poor instrument calibration.

6. ‘Zero error is an indication of instrumental error’. Is the statement true or false?

a)True

b) False

7. Closeness of measured value to true value is _____

a)Accuracy

b)Precision

c)Correction

d) Uncertainty

Answer: a

Explanation: Accuracy of a measurement is defined by closeness of a measured value to true value.

8. _____ of a measuring system refers to its ability to follow instant by instant the measured with time.

a)Bandwidth

b)Fidelity

c)Measurement lag

d) Settling time

Answer:b

Explanation: Fidelity of a measuring system or transducer refers to its ability to follow instant by instant the variations of measured with time.

9. For a measuring system, dynamic sensitivity is required to be _____ of static sensitivity.

a) ±2%

b) ±5%

c) ±10%

d) ±20%

Answer: a

Explanation: For a measuring system, tolerated variation of dynamic sensitivity is only ±2% of static sensitivity. That is dynamic sensitivity should be minimum

10. What is the span of an instrument, operating under a bias which read value for 230V to 450V

a)450

b)220

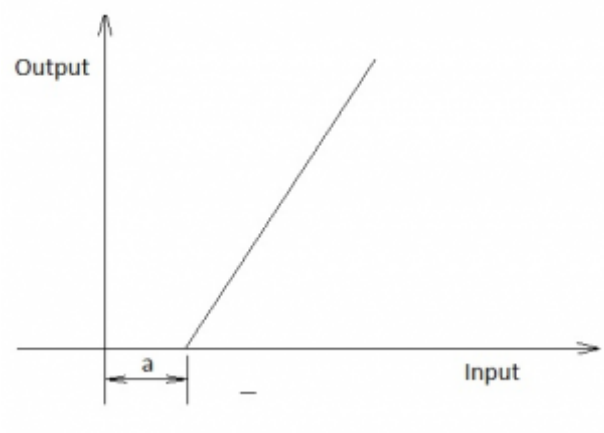
c)230

d)400

Answer:b

Explanation: Span of an instrument is the difference between upper and lower calibrated values. Hence, span in this case is 450 – 230 = 220.

11. Given input out characteristic of a typical system, name the region marked as ‘a’



a) Dead zone

b) Range

c) Drift region

d) Threshold

Answer:a

Explanation: Dead zone is the region in which output starts responding to input. It is marked as region a, below which there is no output for input.

12. What will be the ratio of amplitudes of largest (maximum) signal to smallest (minimum) signal to which the system is subjected?

a)Time constant

b)Settling period

c)Dynamic range

d)Bandwidth

Answer:c

Explanation: Ratio of amplitude of large signal to small signal is termed as dynamic range of system.

13. For a Measurement, indicated value is 225V while true value if 226V. What will be the static error of instrument?
    a) 1V
    b) -1V
    c) 0.5V
    d) -0.5V

Answer:b

Explanation: Static error is the difference between measured value and true value of a measurement. Here measured value is 225V while true value is 226V.

14. What is the relation between static error and static correction?
    a) Static error is negative of static correction
    b) Both are equal
    c) No relation
    d) Both will be always positive

Answer: a

Explanation: From the definition of static correction and static error, it is clear the both are negative to each other.

Static correction = (true value – indicated value) = – (static error).

15. What is ‘live zero’?
    a) Output zero for zero input
    b) Output non zero for zero input
    c) Output null for all input
    d) Output unpredictable

Answer: b

Explanation: Live zero is a term used to describe system in which output has a nonzero value for zero input

Assignment questions:

1. Distinguish between static and dynamic characteristics of an instrument
2.Explain the terms accuracy and precision and discuss the need for having them properly matched to each other.
3. Explain the term fidelity.
4. Distinguish between periodic and aperiodic signals and give examples for each.
5. Describe the process of obtaining a PCM signal.

Short question:

1. What are the line spectra of a signal and how they are represented?
2. Distinguish between static and dynamic characteristics of an instrument
3. Explain the term fidelity.
4. Define repeatability and reproducibility.
5. Distinguish between periodic and aperiodic signals and give examples for each.

Long questions:

1. Explain the terms accuracy and precision and discuss the need for having them properly matched to each other.
2. Describe the process of obtaining a PCM signal.
3. Distinguish between systematic and random errors in a measurement and how they are usually minimized.
4. What is the difference between phase and frequency modulation?
5. Define distortion of a periodic signal and how it is estimated.

MID QUESTION:

1. **a**) what is mean by Periodic and Aperiodic signals **(2M)** CO-1

   b) The expected value of the voltage to be measured is 200v however the measurement given a value of 198v. Calculate **(3M)**

   i) Absolute error

   ii) Percentage of accuracy

   iii) Error expected as percentage of full-scale reading the scale rang (0-300)
2. **a)** What is modulation and how many types of modulation techniques. **(2M)** CO-1
3. What is measuring system? What are the performance characteristics in measuring system? **(2M**) CO-1
4. What is analog modulation? Explain types of analog modulations briefly with neat sketches. **(5M**) CO-1
5. How many types of errors in measurement. Explain briefly systematic errors in measurement.

UNIT-2

MULTIPLE CHOICE QUESTIONS:

1. CRO gives the visual representation of time varying signals. The display of the signalis
   a. one dimensional
   b. two dimensional
   c. three dimensional
   d. four dimensional

   answer: b. Two dimensional

2. Principally CRO is
   a ammeter
   b. voltmeter
   c. wattmeter
   d. watt-hour meter

   answer: b. Voltmeter
3. The sweep generator of a CRO is used to produce

a. sinusoidal voltage for the horizontal deflection of electron beam

b. saw tooth voltage for the vertical deflection of electron beam

c. sinusoidal voltage for the vertical deflection of electron beam

d. saw tooth voltage for the horizontal deflection of electron beam

Answer: d. Saw tooth voltage for the horizontal deflection of electron beam

4. Which part is called as heart of CRO?
   a. crt
   b. sweep generator
   c. trigger circuit
   d. amplifier
   answer: a. crt

1. The light emitted by the zinc silicate coated fluorescent screen of cathode ray tube is usually of

   a. green colour
   b. yellow colour
   c. blue colour
   d. white colour
   answer: a. Green colour

6. If the bombardment of electrons ceases i.e. when the signal becomes zero then the light emitted by the screen will

   a. disappear immediately

   b. persist for some time then it will disappear

   c. will not disappear at all

d. none of these

Answer: b. persist for some time then it will disappear

7. In terms of the division on screen, the voltage of the waveform in CRO is

a. average voltage

b. rms voltage

c. peak to peak voltage

d. maximum voltage

answer: c. peak to peak voltage

8. The Lissajous patterns help in the measurement of

a. phase difference between two sine wave

b. frequency of one waveform if the frequency of other waveform is known

c. both (a) and (b)

d. none of these

answer: c. both (a) and (b)

9. If the two input waveforms f equal amplitude and 90 degree phase difference is applied to the CRO then the Lissajous patterns obtained will be

a. straight line tilted at 45 degree with respect to x-axis

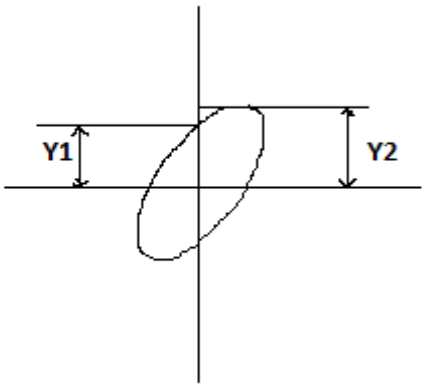
b. circle

c. ellipse

d. vertical straight line

answer: b. circle

Q10.



The phase difference between two waveforms in the above figure is given by

a. $\emptyset = \sin^{-1} y1/y2$

b. $\emptyset = \sin^{-1} y2/y1$

c. $\emptyset = \tan^{-1} y2/y1$

d. $\emptyset = \tan^{-1} y1/y2$

answer: a. $\emptyset = \sin^{-1} y1/y2$

11. Digital voltmeters converts _____

a) analog to digital signal

b) digital to analog signal

c) current to voltage

d) resistance to voltage

Answer: a

Explanation: In general digital voltmeters are known as DVM. They convert analog signals into digital voltage. They also display the voltage to be measured in the form of discrete numerals in place of pointer deflection.

12. Digital voltmeters can be used to measure _____

a) voltage only

b) voltage, temperature, pressure etc.

c) voltage and current

d) voltage and resistance

View Answer

Answer: b

Explanation: Digital voltmeters are used for the measurement of A.C. as well as D.C. voltages and also to measure physical quantities such as temperature, pressure, stress etc. through the use of appropriate transducer and signal conditioning circuits.

13. Input range of DVM is _____

a) 1 V to 1000 V

b) 0.1 V to 10 V

c) 0.01 V to 1 V

d) 0.001 V to 0.1 V

View Answer

Answer: a

Explanation: In a DVM, the input voltage range is given as 1 V to 1000 V. It includes automatic range selection and overload indication.

14. Basic range of DVM is _____

a) 1 or 10 V

b) 0.1 or 1 V

c) 10 or 100 V

d) 100 or 1000 V

View Answer

Answer: a

Explanation: In a DVM, the basic range is 1 V or 10 V. Range of a DVM can be extended from a few μV to kV. This is achieved by making use of an attenuator.

15. Accuracy of a DVM is _____

a) low

b) high

c) medium

d) zero

View Answer

Answer: b

Explanation: Accuracy of a DVM is based on the resolution. Resolution depends on the number of digits. The more the number of digits, the higher is the accuracy. For a DVM, the accuracy is of the order of ±0.005 % of the reading.

16. Input impedance of a DVM is _____

a) low

b) zero

c) high

d) medium

View Answer

Answer: c

Explanation: Typical input impedance of a DVM is usually very high. Typical value is of the order of 10 MΩ. This is usually done in order to reduce the loading effect.

17. In DVM the common mode rejection noise is eliminated by _____

a) increasing the signal amplitude

b) making use of a resistance

c) using a transformer

d) guarding

View Answer

Answer: d

Explanation: In a DVM, common mode noise can be eliminated through guarding. A guard is basically a sheet metal box around the circuit. This is made available to the circuit being measured by making use of a terminal at the front panel.

18. A successive approximation type DVM makes use _____

a) of a digital divider

b) of an analog divider

c) of an oscillator

d) of a transducer

View Answer

Answer: a

Explanation: Servo balancing type DVM makes use of a linear divider in a potentiometer. In the case of a successive approximation type DVM we make use of a digital divider. A digital divider is basically a digital to analog converter.

19. Ramp type DVM uses
    a) a linear ramp technique
    b) a non-linear ramp technique
    c) an exponential ramp technique
    d) an asymptotic ramp technique

    Answer: a
    Explanation: A ramp type DVM makes use of a staircase ramp technique or a linear ramp technique. Compared to the linear ramp technique, the staircase ramp technique is much simpler.

20. Linear ramp technique is based on
    a) voltage measurement
    b) time measurement
    c) current measurement
    d) resistance measurement

    Answer: b
    Explanation: Linear ramp technique works on the principle of measurement of time required by a linear ramp to rise from 0 V to the input voltage. It can also be the time required by the input voltage to fall to 0 V.

Short questions:

1. Describe the overview of applications of a cro
2. Describe the different parts of a crt.
3. Explain the advantages of digital indicating instrument over their anlog counter parts.
4. Explain the function of a ramp type digital voltmeter.
5. Explain lissajous pattern.
6. Mention two methods of focusing an electron beam. Give applications for each.

Long questions:

1. Describe the working of an integrating type digital voltmeter.
2. Explain the function of successive approximation type digital voltmeter.
3. Explain the functioning of time base generator in a cro
4. Describe in details the construction and working of an analog type storage oscilloscope.
5. What is microprocessor based DVM.
6. Derive the expression for vertical deflection of an electron beam in a CRT with neat sketches.
7. How can we calculate digital frequency by using digital frequency meters

Assignment questions:

1. Describe the overview of applications of a cro
2. Explain the advantages of digital indicating instrument over their anlog counter parts.
3. Explain the function of successive approximation type digital voltmeter.
4. What is microprocessor based DVM.

5. Explain the functioning of time base generator in a c

Unit-3

MCQS:

1. Range of frequency selective wave analyzers
   a) 10HZ-20KHZ
   b) 20HZ-10KHZ
   c) 10HZ-10KHZ
   d) 20HZ-20KHZ
   Answer: d

2. Which distortion occurs the amplification factor of the amplifier is different for all frequencies in the input signal
   a) Frequency
   b) Amplitude
   c) Phase
   d) Cross over
   Answer: a

3. What is the formula for nth harmonic distortion Dn=
   a) En/E2
   b) En/E1
   c) E2/E1
   d) E1/En
   Answer: b

4. Low pass filters used in which type of analyzers

a) Frequency selective wave analyzers
b) Heterodyne wave analyzers
c) Spectrum analyzers
d) Distortion analyzers
Answer: a

5. Radio frequency spectrum analyzers operating range
   a) 10MHZ-20GHZ
   b) 20KHZ-10GHZ
   c) 10MHZ-40GHZ
   d) 40KHZ-40GHZ
   Answer: c

6. ---------- Instruments measure the basic frequency properties of a signal.
   Answer: signal analyzers

7. Spectrum analyzers operating range----------
   Answer: 0.02HZ-250GHZ

8. ---------- analyzer instrument designed to measure frequency component in a complex wave form
   Answer: wave analyzers

9. Formula for THD----------
   Answer: (summation of harmonics hole squer whole power of ½)/ fundamental
10. ---------- analyzers is defined energy distribution across the frequency spectrum of a input signal
    Answer: spectrum analyzers
11. In a Q meter the value of shunt resistance connected across the oscillator is typically of the order of [b]
    a) Ohm
    b) Milli ohm
    c) Micro ohm

d)Killo ohm

12. Spectral displays are used in which domain [b]
    a) time domain
    b) frequency domain
    c) both
    d) none

13. Storage factor Q= _WL/R_____
14. Resonance condition _Xl=Xc_____, resonant frequency fo= ___1/2pi rootLC____
15.

Assignment questions:

1. How many types of signal analyzers
2. Explain frequency selective wave analyzers
3. Explain harmonic distortion analyzers
4. Explain briefly THD. How can you eliminate THD
5. Explain briefly spectrum analyzers.
6. Explain basic spectrum analyzers and spectral displays
7. Briefly explain Q-meter, Construction and working?
8. Explain heterodyne wave analyzers

Short questions:

1. What is wave analyzers
2. What is vector impedance meter?
3. Explain heterodyne wave analyzers
4. Explain harmonic distortion analyzers
5. What is peak reading voltmeter?

Long questions:

1. Explain frequency selective wave analyzers
2. Briefly explain Q-meter, Construction and working
3. Explain basic spectrum analyzers and spectral displays
4. How many types of signal analyzers
5. What is the difference between the peak reading voltmeter AND RMS voltmeter?

Unit-4

1. Which of the following is not a characteristic of ideal transducer?
a) High dynamic range
b) Low linearity
c) High repeatability
d) Low noise

Answer: b
Explanation: An ideal transducer should show high linearity. A linear system should produce exact output according to input.

2. A transducer converting ground movement or velocity to voltage is known as _____
a) Geophone
b) Pickup
c) Hydrophone
d) Sonar transponder

Answer: a
Explanation: Geophone is a device used to convert ground movement to voltage, which is used in Remote ground sensors (RGS) and also as a replacement for broadband seismometers.

3. Which of following represent active transducer?
a) Strain gauge
b) Thermistor
c) LVDT
d) Thermocouple

Answer: d
Explanation: Active transducers are self-generating type, they don't require external power to work while passive transducers require external power to work.

4. Which transducer is known as 'self-generating transducer'?
a) Active transducer
b) Passive transducer
c) Secondary transducer
d) Analog transducer

Answer: a
Explanation: The name self-generating transducer is due to its property of working without the use of external power.

5. What is the relation between scale factor and sensitivity of a transducer?
a) Scale factor is double of sensitivity
b) Scale factor is inverse of sensitivity
c) Sensitivity is inverse of scale factor
d) Sensitivity is equal to scale factor

Answer: b
Explanation: Sensitivity is an important property of transducer. Every transducer should be sufficiently sensitive to provide some output that can be detected.

6. Which of the following is an analog transducer?
a) Encoders
b) Strain gauge
c) Digital tachometers
d) Limit switches

Answer: b
Explanation: Analog transducers convert physical quantity to analog signals while digital transducers convert physical quantity to digital signals. Strain gauge is an example of Analog transducer.

7. What is the principle of operation of LVDT?
a) Mutual inductance
b) Self-inductance
c) Permanence
d) Reluctance

Answer: a
Explanation: Linear variable differential transformer (LVDT) is type of transformer used for measuring displacement, and it has same principle of operation of transformer.

8. Which of the following can be measured using Piezo-electric transducer?
a) Velocity
b) Displacement
c) Force
d) Sound

Answer: c
Explanation: Piezo-electric crystals produces electric signal when pressure applied. Examples are quartz, Rochelle salt. That is, it converts force into electric signals.

9. Capacitive transducer are used for?
a) Static measurement
b) Dynamic measurement
c) Transient measurement
d) Both static and dynamic

Answer: b
Explanation: Capacitive transducers convert measurant into changes in capacitance. Change in capacitance is caused by change in dielectric or change in distance between plates.

10. Which of the following is used in photo conductive cell?
a) Selenium
b) Quartz
c) Rochelle salt
d) Lithium sulphate

Answer: a
Explanation: Photo conductive action is the property of reduction of resistance when exposed to light. Selenium shows photoconductive action.

11. Piezoelectric transducer is used for measuring
a) non-electrical quantities
b) electrical quantities
c) chemical quantities
d) any quantity

Answer: a
Explanation: A piezoelectric transducer is used for measuring non-electrical quantities such as vibration, acceleration, pressure and the intensity of sound.

12.Piezoelectric transducer consists of _____
a) copper rod
b) aluminum wire
c) gold crystal
d) quartz crystal

Answer: d
Explanation: A piezoelectric transducer consists of a quartz crystal. It comprises of silicon and oxygen arranged in a crystal structure of SiO_2.

13.A piezoelectric transducer has a _____
a) very high sensitivity
b) low sensitivity
c) high sensitivity
d) zero sensitivity

Answer: c
Explanation: The sensitivity is high in a piezoelectric transducer. A piezoelectric transducer can be used as a sensor. It can also be used in an accelerometer due to its good frequency response.

14.A piezoelectric transducer is used as an ignition source for a cigarette.
a) True
b) False

Answer: a
Explanation: Cigarettes use piezoelectric transducers as a source of ignition. They are also used in the measurement of sonar, microphone, pressure, displacement and force.

15. Thermistor is a transducer. Its temperature coefficient is
a) negative
b) positive

c)zero
d) none of these

Answer: a. negative

16. Strain gauge is a

a) active device and converts mechanical displacement into a change of resistance

b) passive device and converts electrical displacement into a change of resistance

c) passive device and converts mechanical displacement into a change of resistance

d) active device and converts electrical displacement into a change of resistance

Answer: c. passive device and converts mechanical displacement into a change of resistance

17. The linear variable differential transformer transducer is
a) inductive transducer
b) non-inductive transducer
c)capacitive transducer
d) resistive transducer

Answer: a. inductive transducer

18. With the increase in the intensity of light, the resistance of a photovoltaic cell
a)increases
b) decreases
c)remains same
d) none of these

Answer: b. decreases

19.If the displacement is measured with strain gauge then the number of strain gauge normally required area.

a) one
b) two
c)three
d) four
Answer: d. four

20)function of transducer is to convert
a)electrical signal into non electrical quantity
b) non electrical quantity into electrical signal
c)electrical signal into mechanical quantity
d) all of these

Answer: b. non electrical quantity into electrical signal

Assignment questions

1. Explain how to use a bonded resistance wire strain gauge.
2. List the factors to be considered while selecting a transducer for a given application
3. a) Explain the working principle of strain gauge. Derive its gauge factor.
   b) Give the applications of thermistors.

4. Explain the constructional and working principle of LVDT and describe the properties of materials used in Piezo transducers.
5. Which device is used for error detecting transmission? Explain

Short questions

1. What is transducer explain?
2. Write principle of strain gauge?
3. What are the advantages and classification of transducers?
4. What is synchro transmitter?
5. List the factors to be considered while selecting a transducer for a given application

Long questions

1. a) Explain the working principle of strain gauge. Derive its gauge factor. b) Give the applications of thermistors.
2. Explain the constructional and working principle of LVDT and describe the properties of materials used in Piezo transducers
3. Which device is used for error detecting transmission? Explain
4. What are optical detectors explain with neat diagram
5. How to measure temperature by using thermocouple?

Unit-5

1. Non-electrical quantities are measured directly.
a) True
b) False

Answer: b
Explanation: All non-electrical quantities are measured indirectly. The non-electrical quantities are converted into their equivalent voltages or currents using different transducers.

2. The instruments used for the measurement of pressure is/are
a) bellows
b)diaphragms
c)fiber optic pressure sensors
d) all of these

Answer: d. all of these

3.bourdon tube is used for the measurement of gauge pressure of
a) gas
b) liquid fluid
c)solid
d) both (a) and (b)

Answer: d. both (a) and (b)

4. dead weight gauge is used for the measurement of pressure of

a)about 1000 bar
b) about 2000 bar
c)about 5000 bar
d) about 7000 bar

Answer: d. about 7000 bar

5. Which is used to measure linear displacement [d]

a) Strain gauges
b) Capacitive transducers
c) All of the above
d) None of the above

6. By using strain gauges which one can measure [d]
a) Torque
b) Gauge factor
c) Gauge sensitivity
d) All of the above

7. Piezo electric crystal used to measure [c]
a) Force
b) Acceleration
c) Both
d) None

8. Formula for gauge sensitivity _____
9. Measurement of torque two shafts is inclined with ___45__angle
10. Measurement of liquid level ____2_____ conversions is required

11. For measuring velocity_ moving coil_____ transducer is most common used

Assignment questions:

1. What is acceleration? Explain types of accelerometer with neat diagrams.
2. How can measure velocity by using moving coil transducers.
3. How can you measure temperature explain with neat diagrams.
4. How can you measure liquid level?
5. How can you measure flow by using turbine meter.

Short questions:

1. What is gauge sensitivity?
2. What is acceleration?
3. How can produce piezo electric crystal output when force is applied?
4. How can you measure liquid level?
5. What is torque

Long questions:

1. What is acceleration? Explain types of accelerometer with neat diagrams.
2. How can measure velocity by using moving coil transducers?
3. How can you measure temperature explain with neat diagrams.
4. How can you measure flow by using turbine meter.
5. How can you measure torque by using strain gauge